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NATIONAL DAM INSPECTION PROGRAM. LEWIS LAKE DAM (NDI-ID NUMBER --ETC(U)
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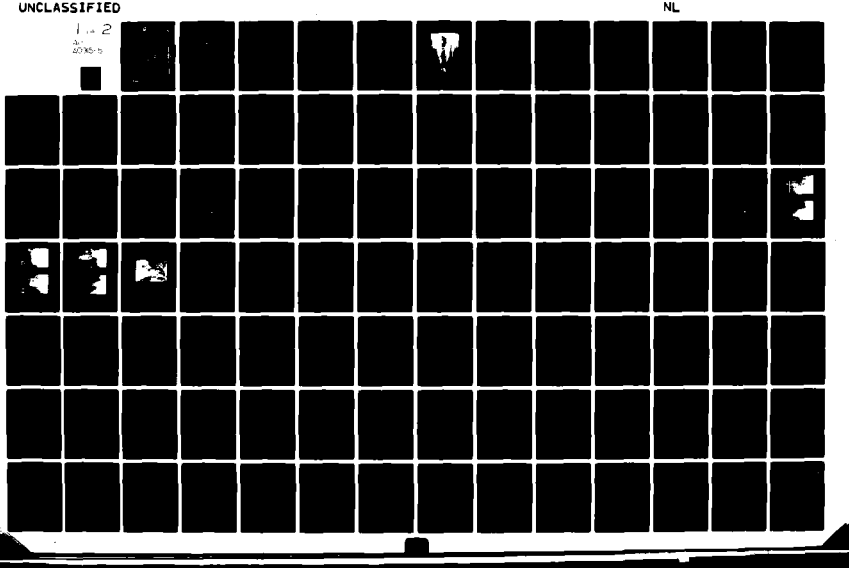

SUSQUEHANNA RIVER BASIN
LEWIS LAKE DAM

NDI NO. PA-00061
DER NO. 58-7

SUSQUEHANNA COUNTY, PENNSYLVANIA

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

DACW31-80-C-0019

PREPARED FOR

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

BY

Berger Associates, Inc.
Harrisburg, Pennsylvania

AUGUST 1980

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PREFACE

This report has been prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITIONS
AND RECOMMENDATIONS

Name of Dam: LEWIS LAKE DAM

State & State No.: PENNSYLVANIA, 58-7

County: SUSQUEHANNA

Stream: FIDDLE LAKE CREEK

Date of Inspection: May 7, 1980

Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in fair condition.

In accordance with the Corps of Engineers' evaluation guidelines, the size classification of this dam is small and the hazard classification is high. These classifications indicate that the Spillway Design Flood (SDF) should be in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. The recommended SDF for this structure is one-half the PMF. The spillway capacity is adequate for passing only 10 percent of the PMF peak inflow without overtopping the dam. The spillway is considered to be seriously inadequate. The dam is therefore unsafe, non-emergency.

The following recommendations are presented for immediate action by the owner:

1. That a detailed hydrologic and hydraulic engineering analysis be made by a professional engineer with experience in the design and construction of dams to determine means for improving the capacity of the spillway and reservoir system so that it will meet the requirements of the Commonwealth of Pennsylvania.

2. That all brush and trees be removed from the embankment slopes and in an area 10 feet beyond the downstream toe of the embankment, and that a professional engineer be consulted regarding removal of the tree stumps and root systems.

3. That the deteriorated areas on the downstream masonry portion of the dam be repaired.

4. That the deteriorated areas of the spillway abutments be repaired, and that the forebay area be cleared of obstructing fill.

5. That a formal surveillance and downstream warning system be developed for use during periods of high or prolonged rainfall.

6. That an operation and maintenance manual be prepared for guidance in the operation of the dam during normal and emergency conditions, and that a schedule be developed for the annual inspection of the dam and its appurtenant structures.

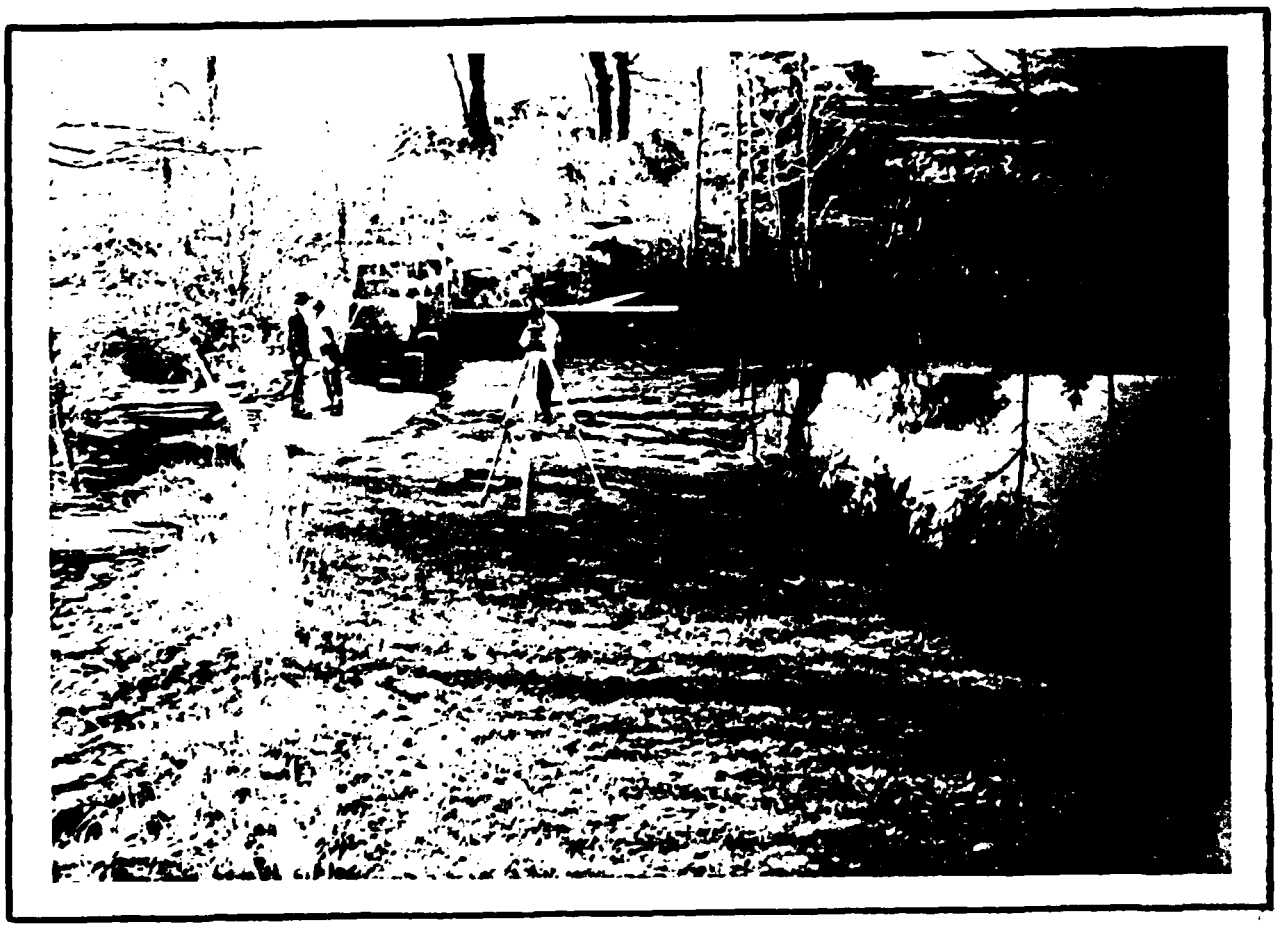
SUBMITTED BY:

BERGER ASSOCIATES, INC.
HARRISBURG, PENNSYLVANIA

DATE: August 1, 1980

APPROVED BY:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer
DATE 30 August 1980



OVERVIEW

LEWIS LAKE DAM

Photograph No. 1

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PHASE I INSPECTION REPORT
(6) NATIONAL DAM INSPECTION PROGRAM

LEWIS LAKE DAM
number
NDI-ID [redacted] PA-00061
DER-ID [redacted] 58-7
number

Susquehanna River Basin, Susquehanna County, Pennsylvania

SECTION 1 - PROJECT INFORMATION

(15) DACW31-78-C-0070

(10) Hendrik/Jon

1.1 GENERAL

A. Authority

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspections of dams throughout the United States.

B. Purpose

The purpose is to determine if the dam constitutes a hazard to human life and property.

1.2 DESCRIPTION OF PROJECT

A. Description of Dam and Appurtenances

Note: Normal pool level is estimated at Elev. 1710.0 from the U.S.G.S. quadrangle map. This elevation is used as top of spillway elevation in this report. Construction drawings indicate top of spillway elevation at Elev. 95.5.

Lewis Lake Dam is an earth and masonry structure having dry rubble masonry on the downstream side of the embankment and earthfill on the upstream side. The height of the embankment is 15 feet and the length is 186 feet. A double row of wooden sheet piling was driven into the earth portion of the embankment. A concrete cutoff was installed upstream of the spillway, and concrete retaining walls were installed at the spillway abutments.

The spillway is located near the center of the embankment and is on two levels. The lower level is 19 feet long and has a pier and slots for stoplog installation. The upper level is to the left of the lower level and is about 41 feet long. A sluiceway, located to the right of the spillway, has been plugged with concrete.

4/11003 A.T

B. Location: Herrick Township, Susquehanna County
U.S.G.S. Quadrangle - Forest City, Pa.
Latitude 41°-43.0', Longitude 75°-29.8'
Appendix E, Plates I & II

C. Size Classification: Small: Height - 15 feet
Storage - 977 acre-feet

D. Hazard Classification: High (Refer to Section 3.1.E.)

E. Ownership: R.C. Panuska, Treasurer
Lewis Lake Association, Inc.
R.D. #1, Box 203
Union Dale, PA 18407

F. Purpose: Recreation

G. Design and Construction History

The dam was built by David Lewis, owner of the dam, in about 1835 as a mill dam. In 1876 the dam was raised by 2 feet and flashboards were installed by the Erie Railway Company in return for water rights. In 1917, the wooded sheet piling was installed, and the spillway was enlarged to its present size. The elevation of the spillway was not raised, but the embankment was raised, and the original timber sluiceway was replaced with a concrete structure. In 1929, the wooden planking that was used for the spillway was replaced with a concrete slab. Concrete retaining walls and a concrete cutoff wall upstream of the spillway were built at that time to replace a portion of deteriorated timber sheet piling. Over the years, a considerable amount of fill has been placed on the embankment to fill areas where settlement has occurred. In 1975 the sluiceway was filled with concrete and a large amount of fill mixed with clay was placed on the embankment and upstream slope to reduce leakage through the downstream wall. This leakage has been reported since 1913.

No information is available on the original design; Plates III and IV in Appendix E show modifications made in 1917 and 1929 respectively.

H. Normal Operating Procedures

The reservoir is used for recreation and all inflow is discharged over the spillway. There are no operating procedures.

1.3 PERTINENT DATA

A. Drainage Area (square miles)

From files: 6.3

	Computed for this report:	6.52
	Use:	6.52

B. Discharge at Dam Site (cubic feet per second)
See Appendix D for hydraulic calculations

Maximum known flood (June, 1972)	351
Spillway capacity at pool Elev. 1714.4 (low point of dam)	825

C. Elevation (feet above mean sea level)

Top of dam (low point)	1714.4
Design crest	1715.0
Spillway crest	1710
Streambed at downstream toe of dam (estimate)	1699

D. Reservoir (miles)

Length of normal pool	0.6
Length of maximum pool	0.7

E. Storage (acre-feet)

Spillway crest (Elev. 1710)	737
Top of dam (Elev. 1714.4)	977

F. Reservoir Surface (acres)

Top of dam (Elev. 1714.4)	61.6
Spillway crest (Elev. 1710)	48.7

G. Dam

Refer to Plate III in Appendix E for plan and section.

Type: Earthfill with dry rubble masonry.

Length: 186 feet.

Height: 15 feet.

Top Width: 18 feet.

Side Slopes: Survey:
Upstream - Varies.
Downstream - 1H to 4V

Zoning: Dry rubble masonry on downstream side.

Cutoff: Wooden sheet piling over entire length. Concrete cutoff upstream of spillway.

Grouting: None.

H. Outlet Facilities

None.

I. Spillway

Type: Broad crested weir at two levels. Lower level has slots for stoplog installation.

Length: Lower Level - 19 feet.
Upper Level - 41 feet.

Crest Elevation: Lower Level - 1710
Upper Level - 1711.7

Location: Center of dam.

J. Regulating Outlet

None.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The engineering design data for Lewis Lake Dam are limited to the design drawings prepared by the Erie Railway Company for modifications done in 1917 and 1929. Embankment stability or hydraulic calculations are not available for review.

2.2 CONSTRUCTION

The dam was constructed in about 1835 and modified in 1876 and 1975. There are no records for these periods of construction. Modifications were also made in 1917 and 1929. For these construction periods, progress reports by a state inspector are available in the Pennsylvania Department of Environmental Resources (PennDER) files, along with a set of specifications for the work done in 1917.

2.3 OPERATION

Records of operation have not been maintained by the owner. The PennDER files included copies of previous inspection reports dating back to 1913. Seepage has been reported as a continuing problem. The largest amounts of seepage have occurred to the right of the spillway, and settlement of the embankment adjacent to the sluiceway has been attributed to this seepage. Smaller amounts of seepage were reported to have occurred to the left of the spillway. Trees and brush have not been removed regularly from the embankment. The reservoir was originally used for supplying water to a feed mill, a lumber mill and the Erie Railway. The use by these industries was discontinued many years ago.

2.4 EVALUATION

A. Availability

The available engineering data is contained in the files of PennDER, Harrisburg, Pennsylvania.

B. Adequacy

The available engineering and construction data, combined with the field inspection, are considered to be adequate for making a reasonable assessment of the dam.

C. Operating Records

Operating records, including maximum pool levels, have not been maintained.

D. Post Construction Changes

Post construction changes have included raising the dam by two feet and installing flashboards in 1876; modifying the spillway and sluiceway and raising the embankment in 1917; installing concrete cutoff walls, retaining walls and slab on the spillway in 1929; and plugging the sluiceway with concrete and placing an earth and clay blanket on the upstream embankment slope in 1975.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

A. General

The general appearance of Lewis Lake Dam is fair. The condition can be improved with some regular maintenance work. The spillway, located near the center of the dam, is in fair condition except for the presence of some fill acting as an obstruction in the forebay area and on the upper level of the spillway. The embankment appears to be stable but there is a growth of heavy weeds, small trees and brush on the right embankment. Seepage was not detected.

The visual inspection check list and sketches of the general plan and profile of the dam, as surveyed during the inspection, are presented in Appendix A of this report. Photographs of the facilities taken during the inspection are reproduced in Appendix C.

B. Embankment

The horizontal alignment of the embankment is good. The embankment curves upstream slightly at both abutments. The vertical profile of the dam (Plate A-II, Appendix A), indicates that the crest of the dam is above design elevation except adjacent to the spillway walls.

The embankment is protected with a grass mat on the crest and the upstream slope. There is no riprap protection on the upstream slope. The downstream slope is a near vertical masonry wall. The right end of the embankment has some high weeds, brush and small trees growing from it.

Settlement of the embankment has occurred on the right side of the spillway creating a low area. Some of the stone was displaced from the wall on the downstream side. At the center of the dam, the downstream toe was submerged by tailwater from Fiddle Lake Creek; however, no seepage was noticed coming from the embankment.

C. Appurtenant Structures

The concrete, broad crested spillway is located near the center of the dam. The spillway is on two levels. The lower level has a pier and slots for the installation of stoplogs. The downstream end of the spillway consists of a vertical drop to the natural streambed. The fill which was placed on the upstream slope of the embankment has extended across the spillway approach. This has broadened the crest of the spillway. Over a portion of the upper level spillway crest, the fill extends above the level of the concrete and acts to obstruct flow over the spillway.

The sluiceway, which is located to the right of the spillway, has been plugged with concrete.

D. Reservoir Area

The reservoir is surrounded by woodlands on moderate slopes. Many homes and cottages are located around the lake. The banks are stable. Two other reservoirs are located upstream from Lewis Lake (Plate D-1, Appendix D).

E. Downstream Channel and Area

The immediate downstream channel has a rocky bottom and is relatively wide and flat. About 850 feet downstream is the Borough of Union Dale where one house lies adjacent to the stream banks, and an industrial building has been built over the channel. A potential hazard to loss of life exists if the dam fails. The hazard category is considered to be "High."

3.2 EVALUATION

The overall visual evaluation of the facilities indicates that the dam in in fair condition, mostly as the result of poor maintenance practices. Recommendations include the removal of brush and trees from the embankment, removal of the obstructing fill from the spillway crest, and repair of the deteriorated downstream masonry portion of the dam.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

The dam and reservoir were constructed for use as a mill pond, but have since become a recreational facility. The reservoir is maintained at the normal pool level (top of spillway). All inflow is discharged over the spillway.

4.2 MAINTENANCE OF DAM

The left end of the embankment has a good grass mat, few weeds and appears to be mowed regularly. The right end of the embankment has a heavy growth of weeds, brush and some small trees on the crest and upstream slope.

4.3 MAINTENANCE OF OPERATING FACILITIES

There are no operating facilities for this dam.

4.4 WARNING SYSTEM

There is no formally organized surveillance and downstream warning system in existence at the present time.

4.5 EVALUATION

Operational procedures for Lewis Lake Dam do not exist at the present time. It is recommended that a program be developed for regular maintenance of the dam, which should include the removal of weeds and brush and the clearing of the spillway forebay area. A formal surveillance plan and downstream warning system should be developed for implementation during periods of heavy or prolonged precipitation.

SECTION 5 - HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

A. Design Data

The hydrologic and hydraulic analyses available from PennDER for Lewis Lake Dam were not very extensive. No stage-discharge curve, stage-storage curve, unit hydrograph, or flood routings were contained in the PennDER files.

B. Experience Data

It was reported that the maximum known flood at Lewis Lake Dam occurred in June, 1972, when the water level in the lake reached an elevation about three feet higher than the spillway crest. This flood event was passed without reported damage.

C. Visual Observations

On the date of the inspection, no conditions were observed that would indicate that the appurtenant structures of the dam could not operate satisfactorily during a flood event until the dam is overtopped. It was noted that the outlet sluiceway has been filled in with concrete, eliminating drawdown capability. Upstream of Lewis Lake is one manmade dam and one natural lake. These impoundments were included in the hydrologic evaluation in Appendix D.

D. Overtopping Potential

Lewis Lake has a total storage capacity of 977 acre-feet and an overall height of 15 feet, both referenced to the top of the dam. These dimensions indicate a size classification of "Small," the hazard classification is "High" (see Section 3.1.E.).

The recommended Spillway Design Flood (SDF) for a dam having the above classification is in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. Because of the size, the recommended SDF is one-half the PMF. For this dam, the SDF peak inflow is 5508 cfs (see Appendix D for HEC-1 inflow computations).

Comparison of the estimated SDF peak inflow of 5508 cfs with the estimated spillway discharge capacity of 825 cfs indicates that a potential for overtopping of Lewis Lake exists.

An estimate of the storage effect of the reservoir and routing of the computed inflow hydrograph through the reservoir shows that this dam does not have the necessary storage available to pass the SDF without

overtopping. The spillway-reservoir system can pass a flood event equal to 10% of a PMF.

E. Dam Break Evaluation

The calculations to determine the behavior of the dam in the event of an overtopping and a resulting breaching of the embankment indicates that there will be a substantial increase in water levels downstream from the dam.

Several houses are located in Union Dale about 850 feet downstream from the dam. On the basis of the results of the dam break analysis, using the U.S. Army Corps of Engineers HEC-1 program, the water surface elevations in the vicinity of the houses have been compared for several conditions prior to and after a dam break. (Refer to Table 1, Appendix D). For an earth embankment, it is estimated that one-half foot of overtopping would result in a breach. Calculations indicate that 13 percent of the PMF inflow would cause an overtopping of 0.5 foot. The increase in water levels downstream due to overtopping of 0.5 foot with no failure as compared to no overtopping would be 0.5 foot. While more property would be exposed to flooding, the increase in the hazard to loss of life is not considered significant. With failure, however, the breaching analysis indicates a rise of 5.8 feet above the flow level just prior to breach when considering a 15 minute time to complete the breach and a 3.3 foot rise above flow level just prior to breach when considering a two hour time to complete the breach. The increase in hazard to loss of life and property damage is reflected not only in the increase in depth of water of 5.8 feet in the 15 minute breach and 3.3 feet in the two hour breach, but more significantly in the shorter time to reach the peak. Less time would be available to respond to the flooding under the breach conditions.

Being an earth embankment, it is judged that the breach would be completed between the 15 minute and the two hour period. The numerical difference of water levels is 2.5 feet. The property damage would be similar with either time of failure. Again, however, the time factor is most significant regarding loss of life. Calculations indicate that the water depth will increase at a rate of 5.8 feet in 15 mintues under the 15 minute breach condition.

One manmade dam and one natural lake are located upstream of Lewis Lake Dam. This upstream dam overtops with 13% of a PMF; however, the overtopping occurs on natural ground at the abutment and is not expected to cause failure. For this evaluation, neither of the impoundments were considered to have breached (see Appendix D).

On the basis of these calculations, it is concluded that the hazard to loss of life and property damage is significantly increased when the dam is overtopped and failed as compared to the condition just prior to failure.

Refer to Table 1, Appendix D, for comparison of flood water levels.

F. Spillway Adequacy

The small size category and high hazard category, in accordance with the Corps of Engineers criteria and guidelines, indicates that the SDF for this dam should be in the range of one-half the PMF to the full PMF. The recommended SDF is one-half PMF.

Calculations show that the spillway discharge capacity and reservoir storage capacity combine to handle 10% of the PMF (refer to Appendix D).

Since the spillway discharge and reservoir storage capacity cannot pass one-half of the PMF and because the downstream hazard to loss of life is high and this hazard is significantly increased when the dam fails as compared to just prior to failure, the spillway is judged to be seriously inadequate.

The hydrologic analysis for this investigation was based upon existing conditions of the watershed. The effects of future development were not considered.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

A. Visual Observations

1. Embankment

The visual inspection of Lewis Lake Dam indicates that the slopes are apparently stable. The upstream slope is protected with a grass mat cover to the water's edge. No riprap was used for protection. No sloughage or cracking was noticed. The downstream side is a nearly vertical, dry rubble masonry wall. Some of the stones have been displaced. No buldging was noticed. The profile of the dam indicates that the crest is above design elevation with the exception of a low area to the right of the spillway. No seepage was noticed during the visual inspection. The root system of the trees on the embankment could cause stability or seepage problems and should be removed.

2. Appurtenant Structures

The concrete spillway is in fair condition. Fill had been placed on the upstream slope of the embankment and some of this fill had been placed on top of the upper level spillway crest. At the right abutment of the spillway is the sluiceway structure. The concrete is cracked and deteriorating. Some patching of this concrete has taken place. On the top of the old sluiceway structure considerable spalling has occurred.

B. Design and Construction Data

Records of design and construction were not available for review, with the exception of data on the modifications which took place in 1917 and 1929.

C. Operating Records

There are no formal operating records for this dam. Previous inspection reports indicate that seepage and settlement of the embankment have been problems in the past.

D. Post Construction Changes

Post construction changes have included raising the dam by two feet and installing flashboards in 1876; modifying the spillway and sluiceway and raising the embankment in 1917; installing concrete cutoff walls, retaining walls and slab on the spillway in 1929; and plugging

the sluiceway with concrete and placing an earth and clay blanket on the upstream embankment slope in 1975.

E. Seismic Stability

This dam is located in Seismic Zone 1 and it is considered that the static stability is sufficient to withstand minor earthquake-induced dynamic forces. No studies or calculations have been made to confirm this assumption.

SECTION 7 - ASSESSMENT AND RECOMMENDATIONS

7.1 DAM ASSESSMENT

A. Safety

The visual inspection and the review of the construction drawings and records for modifications to the dam indicate that Lewis Lake Dam is in fair condition. The field inspection did not detect any signs of instability or seepage that would indicate an unsafe condition. Improved maintenance practices are required to ensure continued safe operation of the facility.

The hydrologic and hydraulic computations indicate that the combination of storage capacity and the spillway discharge capacity are able to handle 10 percent of the PMF. Failure of the dam due to overtopping will significantly increase the hazard to loss of life downstream of the dam. The spillway is considered to be seriously inadequate. The dam is therefore considered to be unsafe, non-emergency.

B. Adequacy of Information

The design and construction information contained in the files, combined with the visual inspection, are considered sufficiently adequate for making a reasonable assessment of this dam.

C. Urgency

The recommendations presented below should be implemented immediately.

D. Additional Studies

A detailed hydrologic and hydraulic analysis should be performed by a professional engineer, experienced in the design and construction of dams, to determine means for improving the capacity of the spillway.

7.2 RECOMMENDATIONS

In order to assure the continued satisfactory operation of this dam, the following recommendations are presented to the owner for immediate implementations.

1. That a detailed hydrologic and hydraulic engineering analysis be made by a professional engineer with experience in the design and construction of dams to determine means for improving the capacity of the spillway and reservoir system so that it will meet the requirements of the Commonwealth of Pennsylvania.

2. That all brush and trees be removed from the embankment slopes and in an area 10 feet beyond the downstream toe of the embankment and that a professional engineer be consulted regarding removal of the tree stumps and root systems.

3. That the deteriorated areas on the downstream masonry portion of the dam be repaired.

4. That the deteriorated areas of the spillway abutments be repaired, and that the forebay area be cleared of obstructing fill.

5. That a formal surveillance and downstream warning system be developed for use during periods of high or prolonged rainfall.

6. That an operation and maintenance manual be prepared for guidance in the operation of the dam during normal and emergency conditions, and that a schedule be developed for the annual inspection of the dam and its appurtenant structures.

APPENDIX A

CHECKLIST OF VISUAL INSPECTION REPORT

CHECK LIST

PHASE I - VISUAL INSPECTION REPORT

PA DER # 58-7 NDI NO. PA-00 061

NAME OF DAM LEWIS LAKE DAM HAZARD CATEGORY High

TYPE OF DAM Drystone masonry wall with upstream earth embankment

LOCATION Herrick TOWNSHIP Susquehanna COUNTY, PENNSYLVANIA

INSPECTION DATE 4/7/80 WEATHER Clear TEMPERATURE 50's

INSPECTORS: R. Houseal (Recorder) OWNER'S REPRESENTATIVE(s):

H. Jongsma William Yakley

R. Shireman Joseph Wojak

A. Bartlett

NORMAL POOL ELEVATION: 1710.0 (USGS) AT TIME OF INSPECTION:

BREAST ELEVATION: 1715 (Design) POOL ELEVATION: 1710.3

SPILLWAY ELEVATION: 1710.0 TAILWATER ELEVATION:

MAXIMUM RECORDED POOL ELEVATION: 1713.0 (June, 1972)

GENERAL COMMENTS:

The general appearance of this dam is fair.

In about 1975 the Owner Association placed a considerable amount of fill mixed with clay on the upstream side to reduce leakage through the stone wall. The gate pit was filled at that time. Representatives stated that repairs to downstream wall are planned for the summer of 1980.

NDI NO. PA-00061

VISUAL INSPECTION
EMBANKMENT

	OBSERVATIONS AND REMARKS
A. SURFACE CRACKS	None.
B. UNUSUAL MOVEMENT BEYOND TOE	None. Vertical dry stone wall on downstream side.
C. SLOUGHING OR EROSION OF EMBANKMENT OR ABUTMENT SLOPES	None on slope or abutment. Downstream wall has large deteriorated areas near spillway.
D. ALIGNMENT OF CREST: HORIZONTAL: VERTICAL:	Slightly curved at abutments. Vertical - sloping to concrete structure. Refer to profile.
E. RIPRAP FAILURES	No riprap on upstream slopes. Some failures of downstream walls.
F. JUNCTION EMBANKMENT & ABUTMENT OR SPILLWAY	Abutments appear to be sound.
G. SEEPAGE	None observed.
H. DRAINS	None.
J. GAGES & RECORDER	None.
K. COVER (GROWTH)	Grass on earth crest and upstream slopes. Concrete and stone wall on downstream side. Trees and brush on right embankment.

NDI NO. PA-00 061

VISUAL INSPECTION
OUTLET WORKS

	OBSERVATIONS AND REMARKS
A. INTAKE STRUCTURE	None.
B. OUTLET STRUCTURE	None.
C. OUTLET CHANNEL	None.
D. GATES	None.
E. EMERGENCY GATE	None.
F. OPERATION & CONTROL	None.
G. BRIDGE (ACCESS)	None.

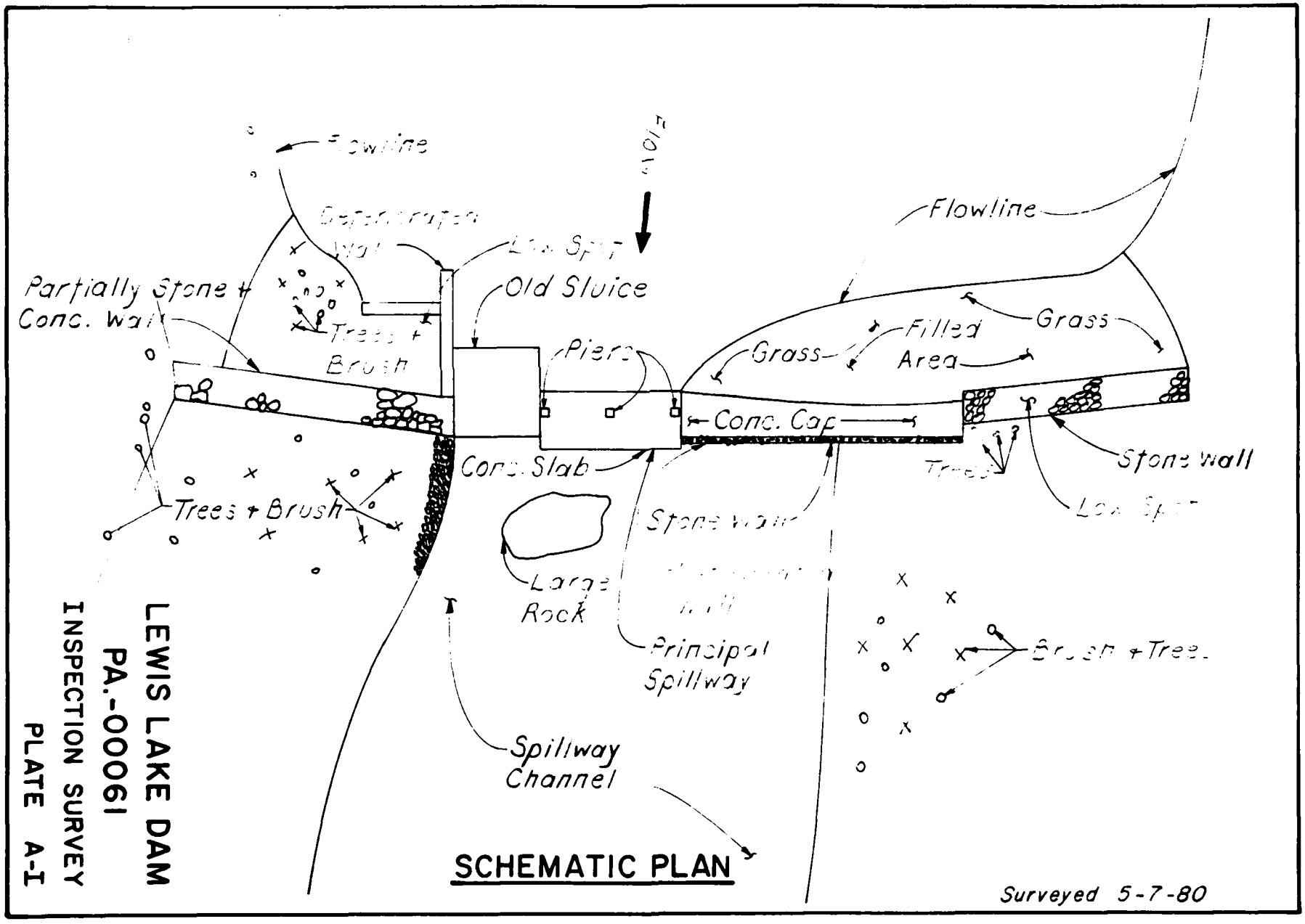
VISUAL INSPECTION
SPILLWAY

	OBSERVATIONS AND REMARKS
A. APPROACH CHANNEL	Water flow approaches spillway directly from the reservoir. No obstructions.
B. WEIR: Crest Condition Cracks Deterioration Foundation Abutments	Concrete broad crested weir. Accomodations are available for installing stoplogs. They have not been used in the past 30 years. Spillway opening partially obstructed with fill.
C. DISCHARGE CHANNEL: Lining Cracks Stilling Basin	Spillway discharges into the natural stream channel. There are no special structures.
D. BRIDGE & PIERS	Piers for stoplogs.
E. GATES & OPERATION EQUIPMENT	None.
F. CONTROL & HISTORY	None.

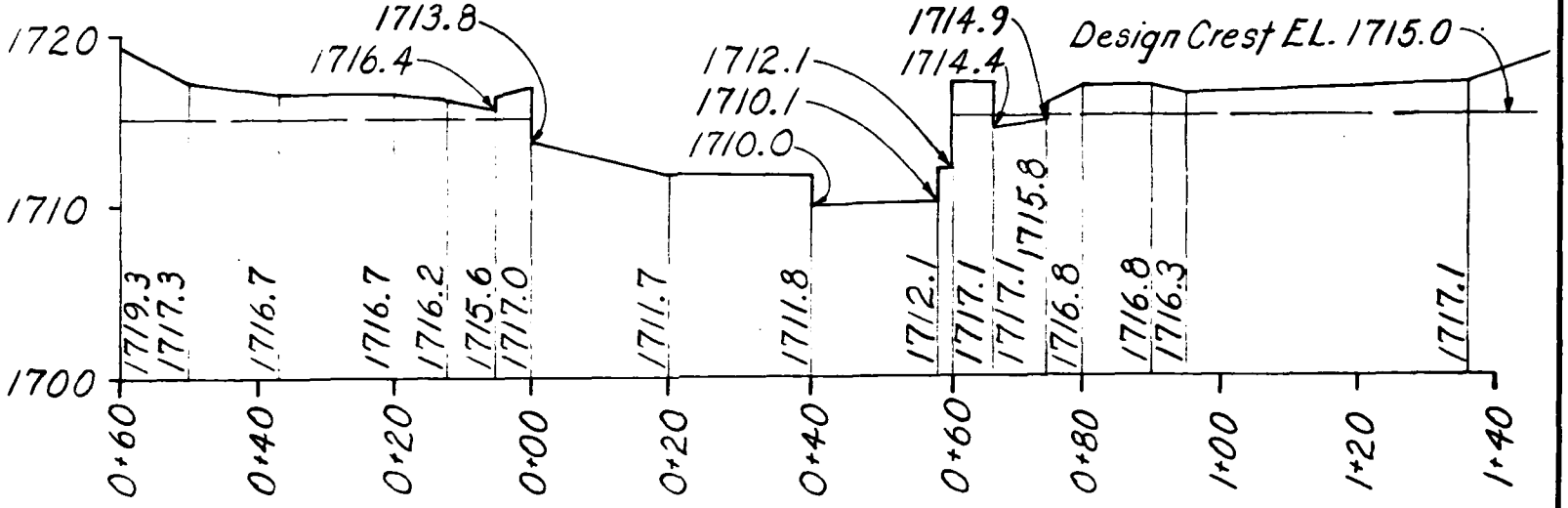
NDI NO. PA-00061

VISUAL INSPECTION

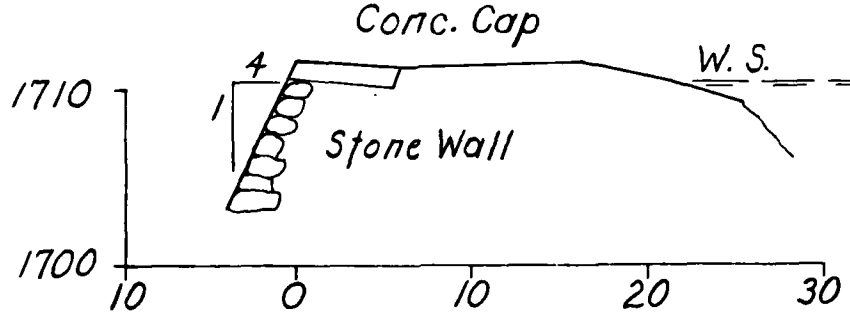
	OBSERVATIONS AND REMARKS
INSTRUMENTATION	
Monumentation	None.
Observation Wells	None.
Weirs	None.
Piezometers	None.
Staff Gauge	None.
Other	None.
RESERVOIR	
Slopes	Wooded.
Sedimentation	None reported.
Watershed Description	Wooded with moderate slopes.
DOWNSTREAM CHANNEL	
Condition	Natural stream, stoney bottom.
Slopes	Moderate with trees and brush.
Approximate Population	10
No. Homes	3, highway and industry.



LEWIS LAKE DAM
PA.-00061
INSPECTION SURVEY
PLATE A-I



EMBANKMENT PROFILE



EMBANKMENT SECTION

Surveyed 5-7-80

LEWIS LAKE DAM
PA.-00061
INSPECTION SURVEY
PLATE A-II

APPENDIX B

CHECKLIST OF ENGINEERING DATA

CHECK LIST
ENGINEERING DATA

PA DER # 58-7 NDI NO. PA-00061

NAME OF DAM LEWIS LAKE DAM

ITEM	REMARKS
AS-BUILT DRAWINGS	None.
REGIONAL VICINITY MAP	U.S.G.S. Quadrangle - Forest City, Pa. See Plate II, Appendix E
CONSTRUCTION HISTORY	Old mill dam built around 1835. Raised 2' in 1876. Spillway widened and embankment raised in 1917. Concrete spillway, concrete cutoff wall upstream of spillway and retaining walls built in 1929. Sluiceway filled with concrete in 1975.
GENERAL PLAN OF DAM	See Appendix E, Plates III and IV.
TYPICAL SECTIONS OF DAM	See Appendix E, Plates III and IV.
OUTLETS: PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	Appendix E. None.

NDI NO. PA-00 061

ENGINEERING DATA

ITEM	REMARKS
RAINFALL & RESERVOIR RECORDS	None.
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS: HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	None.
MATERIALS INVESTIGATIONS: BORING RECORDS LABORATORY FIELD	None.
POST CONSTRUCTION SURVEYS OF DAM	1914 Water Supply Commission survey.
BORROW SOURCES	Unknown.

ENGINEERING DATA

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	Dam raised in 1876. Spillway widened and embankment raised in 1917. Concrete spillway slab, cutoff wall upstream of spillway and retaining walls added in 1929. Sluiceway filled with concrete and embankment widened in 1975.
HIGH POOL RECORDS	None existing.
POST CONSTRUCTION ENGINEERING STUDIES & REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM Description: Reports:	None.
MAINTENANCE & OPERATION RECORDS	None.
SPILLWAY PLAN, SECTIONS AND DETAILS	See Appendix E.

NDI NO. PA-00 061

ENGINEERING DATA

ITEM	REMARKS
OPERATING EQUIPMENT, PLANS & DETAILS	None.
CONSTRUCTION RECORDS	None, except progress report by state inspector and copy of specifications for modification done in 1917.
PREVIOUS INSPECTION REPORTS & DEFICIENCIES	Inspection reports by PennDER indicating seepage through embankment, settlement of embankment and brush on embankment.
MISCELLANEOUS	

NDI NO. PA-00 061

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: 30% farmland, 70% woodland

ELEVATION:

TOP NORMAL POOL & STORAGE CAPACITY: Elev. 1710 Acre-Feet 737

TOP FLOOD CONTROL POOL & STORAGE CAPACITY: Elev. 1714.4 Acre-Feet 977

MAXIMUM DESIGN POOL: Elev. 1715

TOP DAM: Elev. 1714.4

SPILLWAY:

a. Elevation 1710 & 1711.7

b. Type concrete broad crested weir

c. Width 60 feet

d. Length 23 feet

e. Location Spillover near center of dam

f. Number and Type of Gates none

OUTLET WORKS:

a. Type none

b. Location

c. Entrance inverts

d. Exit inverts

e. Emergency drawdown facilities

HYDROMETEOROLOGICAL GAGES:

a. Type none

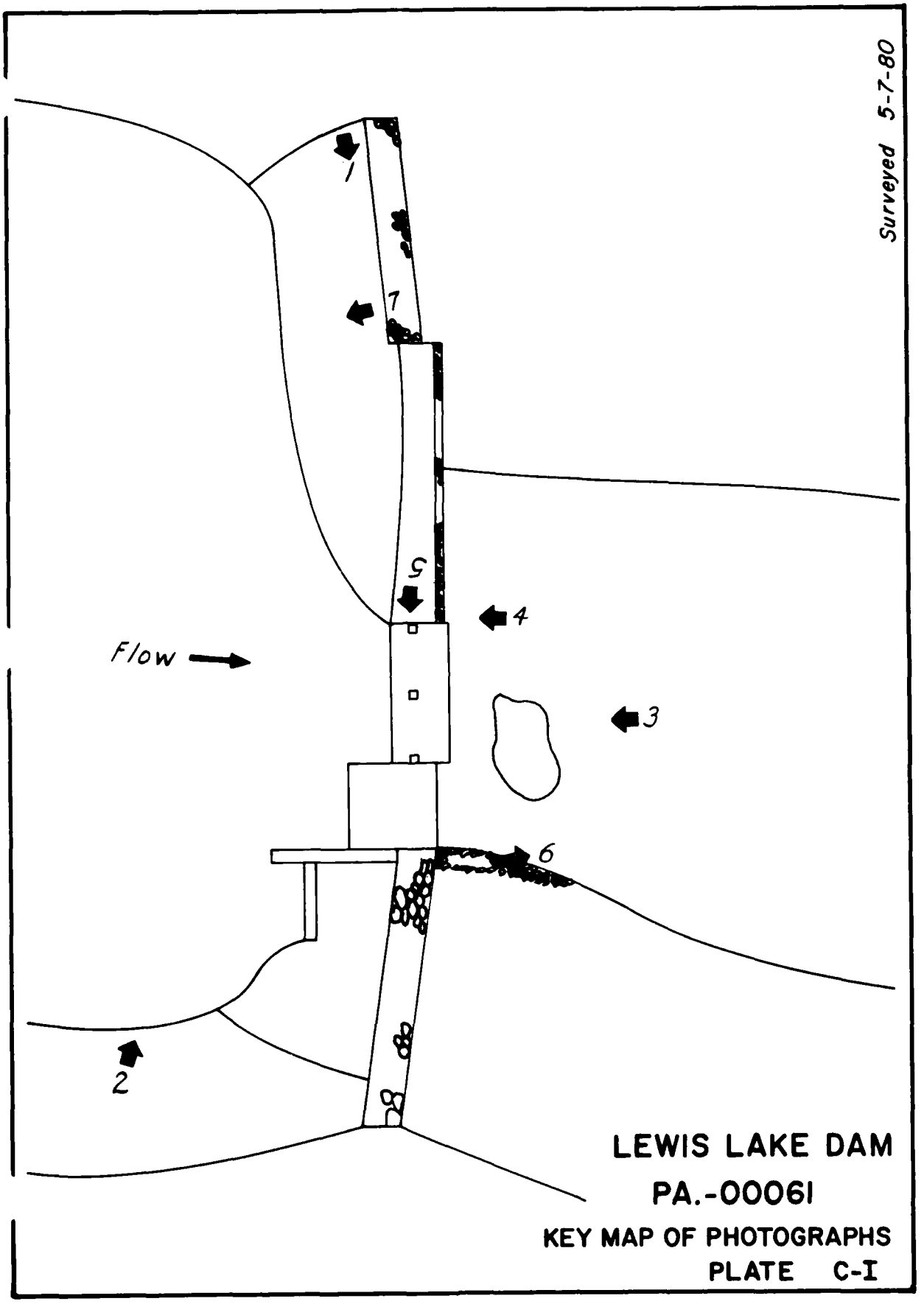
b. Location

c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 825 cfs

APPENDIX C

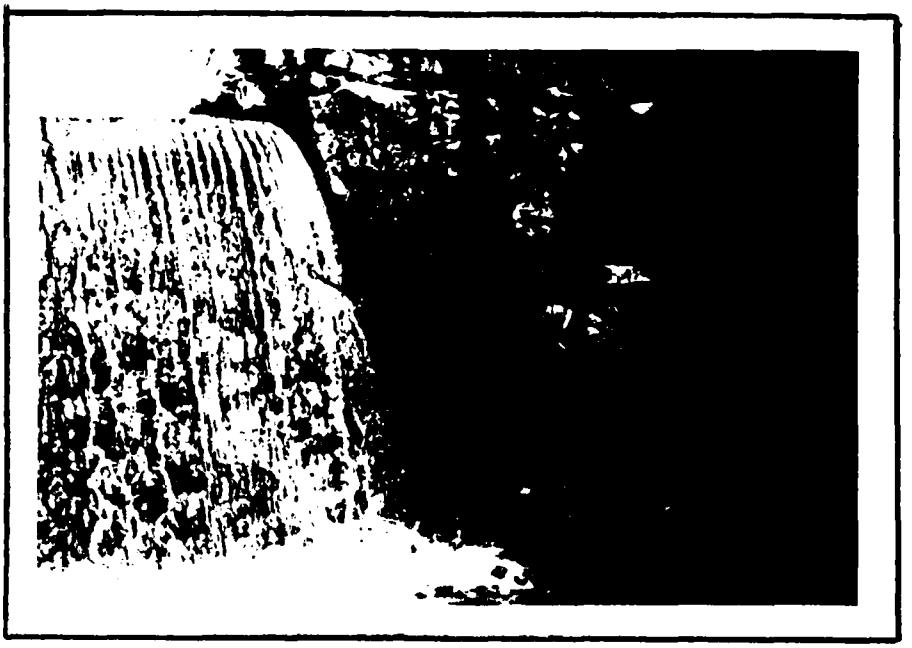
PHOTOGRAPHS


Surveyed 5-7-80
1
7
5
4
Flow
3
6
2
LEWIS LAKE DAM
PA.-00061
KEY MAP OF PHOTOGRAPHS
PLATE C-I

UPSTREAM SIDE FROM RIGHT ABUTMENT - NO. 2

SPILLWAY LOOKING UPSTREAM - NO. 3

PA-00061
Plate C-II

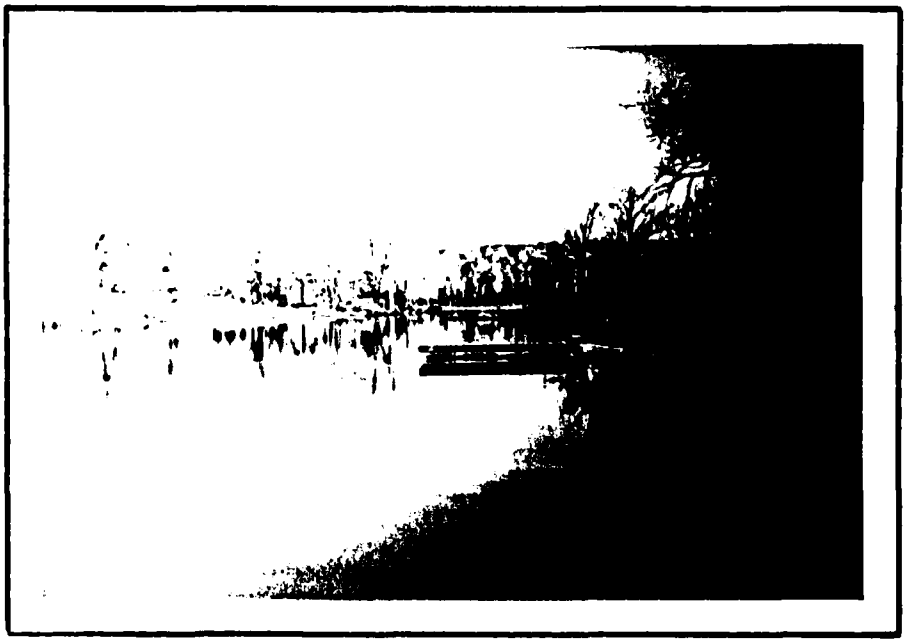


SPILLWAY - NOTE VOIDS IN STONE WALL - NO. 4

OVERVIEW OF SPILLWAY - NO. 5

PA-00061
Plate C-III

DOWNSTREAM CHANNEL OF SPILLWAY - NO. 6



RESERVOIR - NO. 7

PA-00061
Plate C-IV

INDUSTRIAL BUILDING IN UNION DALE - NO. 8

PA-00061
Plate C-V

APPENDIX D

HYDROLOGY AND HYDRAULIC CALCULATIONS

SUMMARY DESCRIPTION
OF
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION

The hydrologic and hydraulic evaluation for this inspection report has employed computer techniques using the Corps of Engineers computer program identified as the Flood Hydrograph Package (HEC-1) Dam Safety Version.

The program has been designed to enable the user to perform two basic types of hydrologic analyses: (1) the evaluation of the overtopping potential of the dam, and (2) the capability to estimate the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. A brief summary of the computation procedures typically used in the dam overtopping analysis is shown below.

- Development of an inflow hydrograph to the reservoir.
- Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.
- Routing of the outflow hydrograph(s) of the reservoir to desired downstream locations. The results provide the peak discharge and maximum stage of each routed hydrograph at the outlet of the reach.

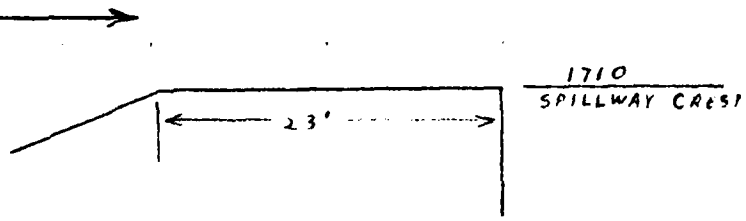
The output data provided by this program permits the comparison of downstream conditions just prior to a breach failure with that after a breach failure and the determination as to whether or not there is a significant increase in the hazard to loss of life as a result of such a failure.

The results of the studies conducted for this report are presented in Section 5.

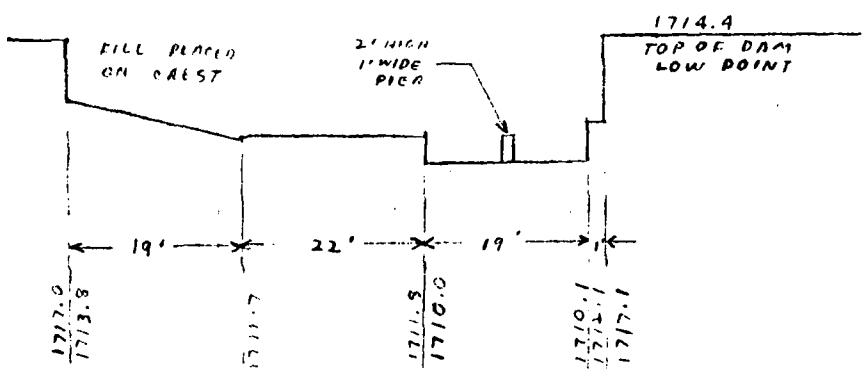
For detailed information regarding this program refer to the Users Manual for the Flood Hydrograph Package (HEC-1) Dam Safety Version prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California.

BY RLS DATE 6/18/80 **BERGER ASSOCIATES** SHEET NO. 1 OF 6
CHKD. BY DATE PROJECT D9650
SUBJECT LEWIS LAKE

SPILLWAY RATING



BROAD CRESTED WEIR
C = 2.7 (KING'S HDBK.)



$$Q = C L_1 H_1^{3/2} + C L_2 H_2^{3/2} + C L_3 H_3^{3/2} + C L_4 H_4^{3/2}$$

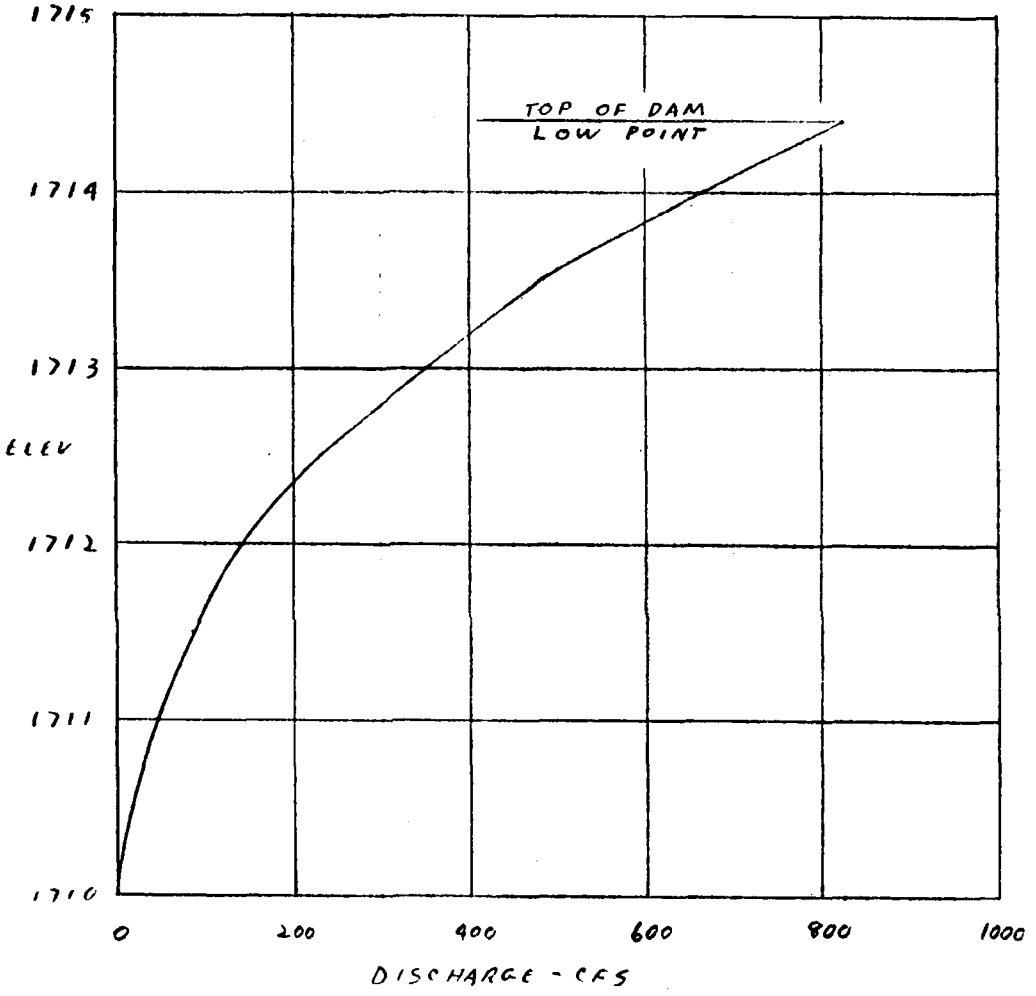
$H_1 = 1714.4 - ((1713.8 + 1711.7)/2) = 1.65'$
$L_1 = 19'$
$H_2 = 1714.4 - ((1711.7 + 1711.8)/2) = 2.65'$
$L_2 = 22'$
$H_3 = 1714.4 - ((1710.0 + 1710.1)/2) = 4.35'$
$L_3 = 18'$
$H_4 = 1714.4 - 1712.1 = 2.3'$
$L_4 = 2'$

$$Q = 2.7 \times 19 \times (1.65)^{1.5} + 2.7 \times 22 \times (2.65)^{1.5} + 2.7 \times 18 \times (4.35)^{1.5} + 2.7 \times 2 \times (2.3)^{1.5}$$

$= 825$ CFS

BY R.L.S. DATE 6/16/86 **BERGER ASSOCIATES** SHEET NO. 2 OF 7
CHKD. BY ____ DATE ____ PROJECT D9650
SUBJECT LEWIS LAKE

SPILLWAY RATING CURVE



BY RLJ DATE 6/18/80 **BERGER ASSOCIATES** SHEET NO. 3 OF 17
CHKD. BY DATE PROJECT 09650
SUBJECT LEWIS LAKE

EMBANKMENT RATING

$Q = CLH^{3/2}$ $C = 2.7$

AT ELEV 1715

$2.7 \times 8 \times (.35)^{1.5} = 4$ CFS

AT ELEV 1716

$2.7 \times 8 \times (1.35)^{1.5} = 34$

$2.7 \times 1 \times (.1)^{1.5} = -$

$2.7 \times 4 \times (.2)^{1.5} = 1$ $\Sigma = 35$ CFS

AT ELEV 1717

$2.7 \times 8 \times (2.35)^{1.5} = 78$

$2.7 \times 5 \times (.7)^{1.5} = 8$

$2.7 \times 11 \times (.2)^{1.5} = 3$

$2.7 \times 4 \times (.45)^{1.5} = 3$

$2.7 \times 36 \times (.35)^{1.5} = 20$

$2.7 \times 7 \times (.3)^{1.5} = 3$

$2.7 \times 6 \times (1.1)^{1.5} = 19$

$2.7 \times 5 \times (.55)^{1.5} = 9$

$2.7 \times 16 \times (.3)^{1.5} = 7$

$2.7 \times 8 \times (.1)^{1.5} = 1$ $\Sigma = 151$ CFS

AT ELEV 1718

$2.7 \times 8 \times (3.35)^{1.5} = 132$

$2.7 \times 5 \times (1.7)^{1.5} = 30$

$2.7 \times 11 \times (1.2)^{1.5} = 39$

$2.7 \times 4 \times (1.45)^{1.5} = 19$

$2.7 \times 41 \times (1.3)^{1.5} = 164$

$2.7 \times 5 \times (.45)^{1.5} = 4$

$2.7 \times 6 \times (.9)^{1.5} = 14$

$2.7 \times 7 \times (1.3)^{1.5} = 28$

$2.7 \times 6 \times (2.1)^{1.5} = 49$

$2.7 \times 8 \times (1.55)^{1.5} = 42$

$2.7 \times 16 \times (1.3)^{1.5} = 64$

$2.7 \times 13 \times (1.05)^{1.5} = 38$

$2.7 \times 4 \times (.4)^{1.5} = 3$ $\Sigma = 626$ CFS

AT ELEV 1719 $\Sigma Q = 1363$ CFS

AT ELEV 1720 $\Sigma Q = 2320$ CFS

AT ELEV 1723 $\Sigma Q = 5825$ CFS

BY RLS DATE 7/29/80 **BERGER ASSOCIATES** SHEET NO. 4 OF 9
CHKD. BY DATE PROJECT
SUBJECT LEWIS LAKE

DISCHARGE SUMMARY

ELEV.	SPILLWAY (CFS)	EMBANKMENT (CFS)	TOTAL (CFS)
1710	0	0	0
1710.5	15	0	15
1711	45	0	45
1711.5	85	0	85
1712	139	0	139
1712.5	231	0	231
1713	351	0	351
1713.5	496	0	496
1714	668	0	668
1714.4	825	0	825
1715	1083	4	1087
1716	1567	35	1602
1717	2113	151	2264
1718	2711	626	3337
1719	3361	1363	4724
1720	4054	2320	6374
1723	6384	5825	12209

MAXIMUM KNOWN FLOOD AT DAMSITE

IT WAS REPORTED THAT THE MAXIMUM KNOWN FLOOD AT THIS DAM OCCURRED IN JUNE 1972 WHEN THE WATER LEVEL IN THE LAKE REACHED AN ELEVATION OF ABOUT 1713.

$$Q = CL_1H_1^{3/2} + CL_2H_2^{3/2} + CL_3H_3^{3/2} + CL_4H_4^{3/2}$$

$$= 2.7 \times 12 \times (.65)^{1.5} + 2.7 \times 22 \times (1.25)^{1.5} + 2.7 \times 18 \times (2.95)^{1.5} + 2.7 \times 2 \times (.9)^{1.5}$$

$$= 351 \text{ CFS}$$

DESIGN FLOOD

SIZE CLASSIFICATION

MAXIMUM STORAGE = 977 ACRE-FEET
MAXIMUM HEIGHT = 15 FEET
SIZE CLASSIFICATION IS "SMALL"

HAZARD CLASSIFICATION

VILLAGE OF UNIONDALE LIES ALONG THE DOWNSTREAM CHANNEL
USE "HIGH"

RECOMMENDED SPILLWAY DESIGN FLOOD

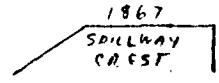
THE ABOVE CLASSIFICATIONS INDICATE USE OF AN SDF EQUAL TO ONE-HALF PMF TO THE FULL PROBABLE MAXIMUM FLOOD.

BY RLS DATE 6/19/80 **BERGER ASSOCIATES** SHEET NO. 6 OF
CHKD. BY DATE PROJECT D9650
SUBJECT LEWIS LAKE

UPSTREAM RESERVOIR

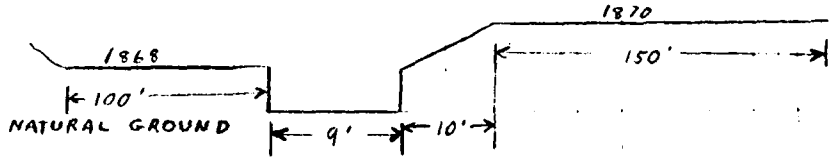
LOWE LAKE

5' HIGH EARTH + MASONRY DAM



BROAD CRESTED WEIR $C = 3.3$

EMBANKMENT $C = 2.7$



$Q = C L H^{3/2}$

$= 3.3 \times 9 \times (1)^{1.5} = 30$ CFS

ELEV.	SPILLWAY (CFS)	EMBANKMENT (CFS)	TOTAL (CFS)
1867	0	0	0
1868	30	0	30
1869	84	275	359
1870	154	791	945
1871	238	1884	2122
1872	332	3446	3778

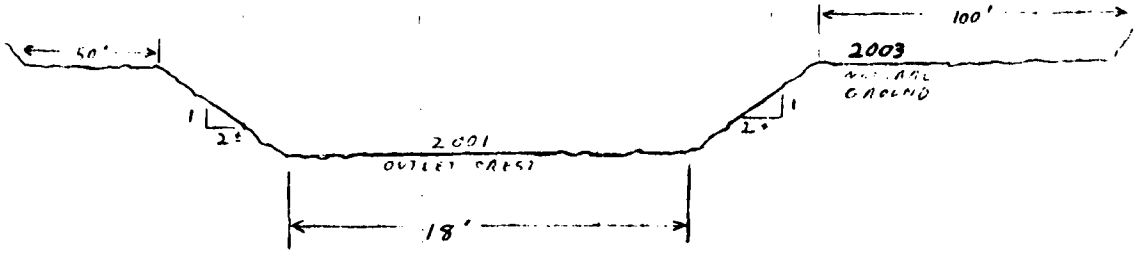
BY RLS DATE 6/19/80 **BERGER ASSOCIATES** SHEET NO. 7 OF
CHKD. BY DATE PROJECT D9650
SUBJECT LEWIS LAKE

UPSTREAM RESERVOIR

FIDDLE LAKE

NATURAL LAKE

NATURAL OUTLET $C = 2.7$



$Q = C L H^{3/2}$

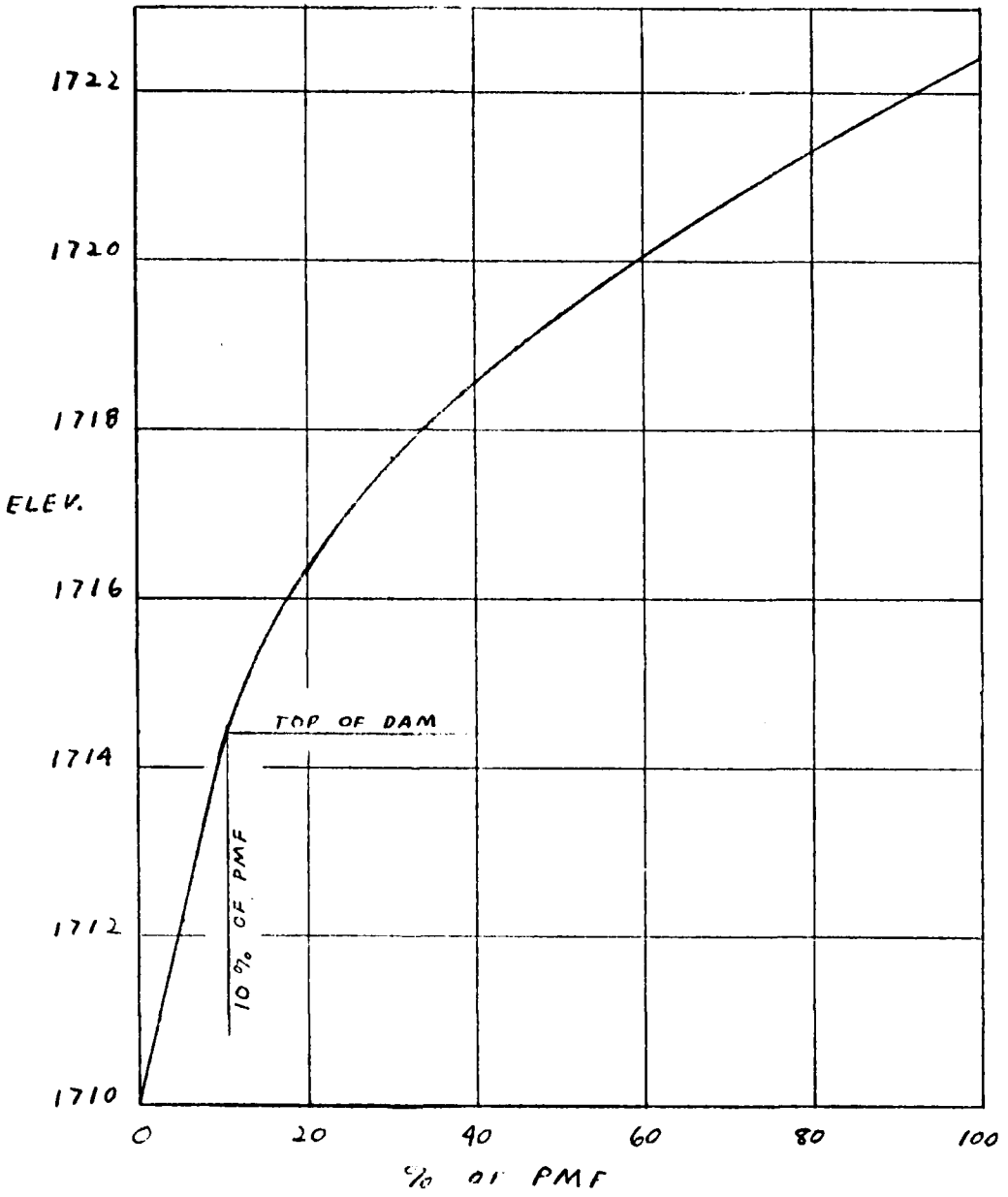
$= 2.7 \times 18 \times (2)^{3/2} + 2.7 \times 8 \times (1)^{3/2}$

$= 159$ CFS

ELEV.	CHANNEL (CFS)	OVERBANKS (CFS)	TOTAL (CFS)
2001	0	0	0
2002	52	0	52
2003	159	0	159
2004	314	405	719
2005	501	1146	1647

BY RLS DATE 7/1/80 **BERGER ASSOCIATES** SHEET NO. 8 OF 9
CHKD. BY DATE PROJECT D965C
SUBJECT LEWIS LAKE

SPILLWAY CAPACITY CURVE



BY RLS DATE 7/1/80 **BERGER ASSOCIATES** SHEET NO. 9 OF 9
CHKD. BY DATE PROJECT 0965S
SUBJECT LEWIS LAKE

BREACH ASSUMPTIONS

BREACH WIDTH = 50'

SIDE SLOPES (EARTH EMBANKMENT) = 1:1

FAILURE TIME (EARTH EMBANKMENT) =
BETWEEN 15 MIN. AND 2 HR.
USE: .25 HR., .5 HR., 1.0 HR., 2.0 HR.

POOL LEVEL AT FAILURE: EARTH EMBANKMENT
SAY 0.5 FT OVER TOP OF DAM

UPSTREAM RESERVOIRS:
FIDDLE LAKE = NATURAL LAKE, WILL NOT BREACH
LOWE LAKE = OVERTOPPED 0.65' BY 13% PMF
(OVERTOPPING OCCURS ON NATURAL GROUND AT ABUTMENT, NOT EXPECTED TO CAUSE FAILURE)

TABLE NO. 1

COMPARISON OF WATER SURFACE ELEVATIONS

LEWIS LAKE DAM

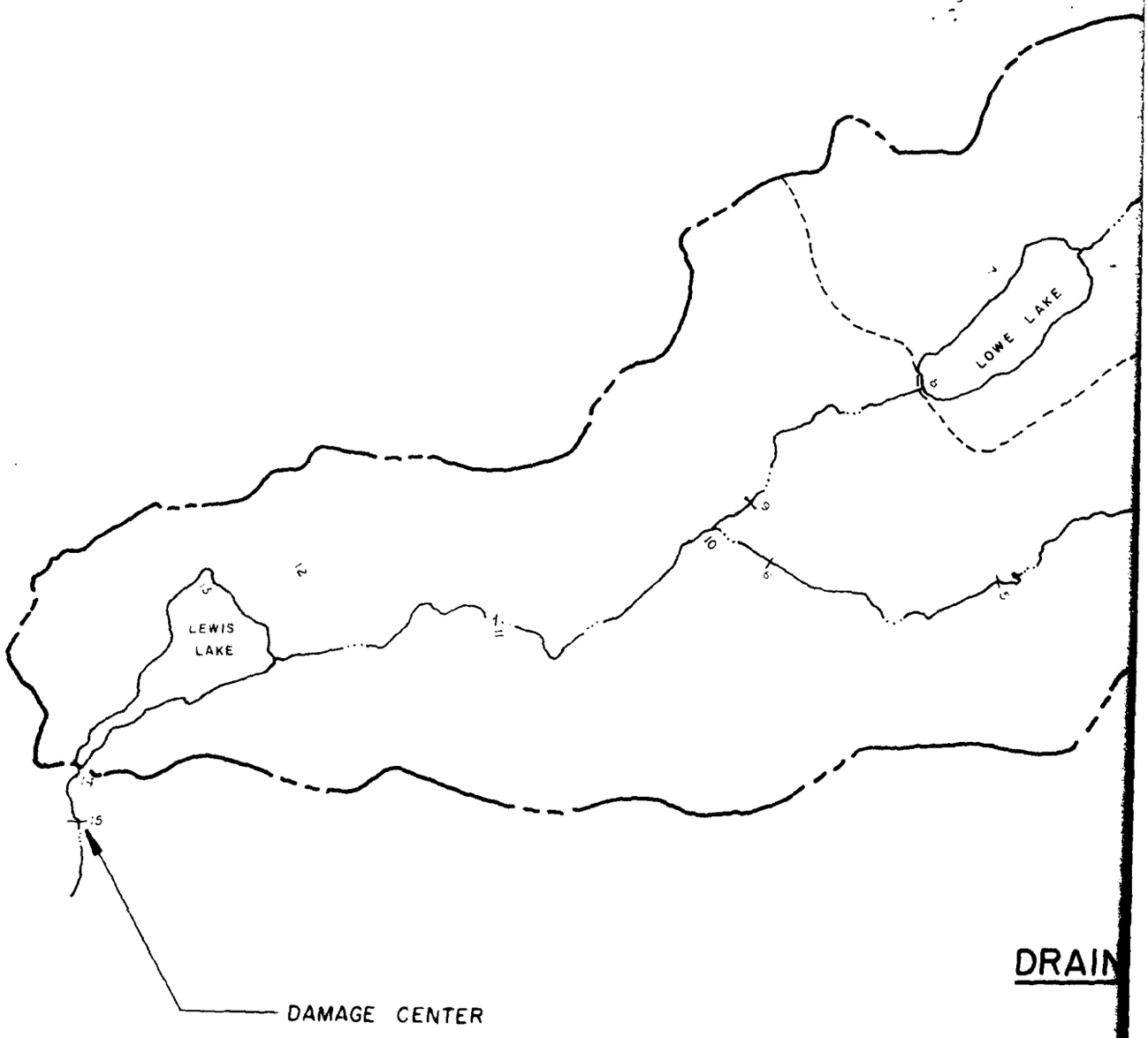
PMF = 11,405 cfs

Crest Elevation - 1714.4 Low Point - 1714.4 Spillway Elevation - 1710.0

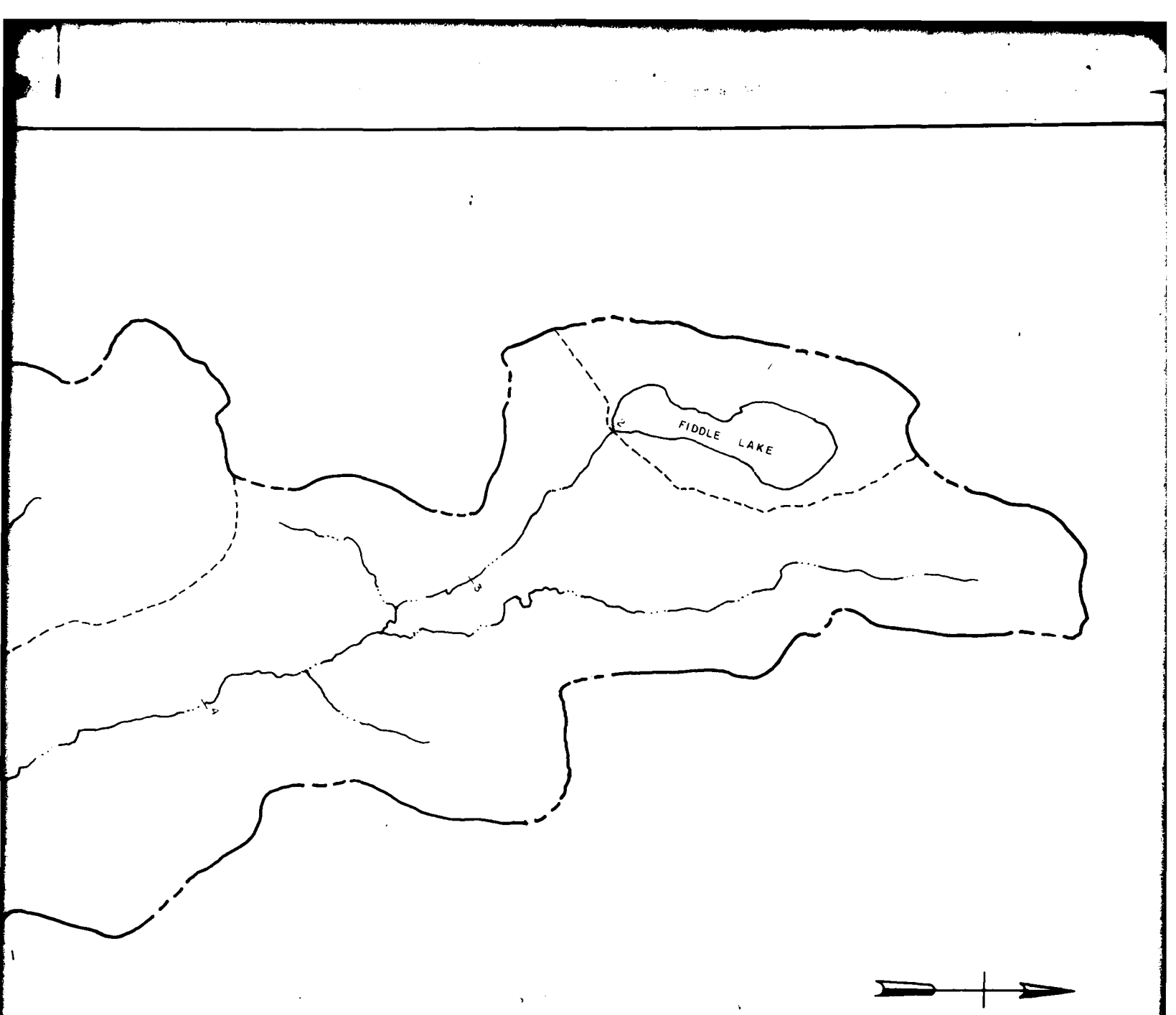
	STAGE	CREST OF DAM ELEVATION	CREST OF DAM DEPTH	850' D/S OF DAM* ELEVATION
A.	At Low Point in Embankment Crest	1714.4	0	1682.3
B.	13% PMF Overtopping No Breach	1714.98	.58	1682.8
C.	13% PMF Overtopping (15 Min. Breach)	1714.93	.53	1688.6
D.	13% PMF Overtopping (2 Hour Breach)	1714.93	.53	1686.1

*Several houses in Union Dale located about 850 feet downstream of Lewis Lake Dam. Considered to be damage center.

Condition C: (Time refers to elapsed time after start of storm). Time to reach breach elevation 1714.9 at dam = 44.50 Hours. Water level 850' downstream prior to breach = 1682.8. Duration of breach = 15 Minutes. Time for breach to peak 850' downstream = .25 Hours. Peak elevation 850' downstream due to breach = 1688.6. Rate of increase in water level = 5.8' in 15 Minutes.



DRAIN



Drainage Area

Sub Drainage Area

Streams

12 Stream Station Identification

AGE AREA MAP

Scale 1"= 2000'

LEWIS LAKE

PA.-00061

PLATE D-

2

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: LEWIS LAKE DAM RIVER BASIN: Susquehanna

PROBABLE MAXIMUM PRECIPITATION (PMP) = 21.2 INCHES/24 HOURS[1]

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		LOWE LAKE	LOWE LAKE DAM	FIDDLE LAKE	
DRAINAGE AREA (SQUARE MILES)		1.1		.42	
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		1.1	1.1	.42	
ADJUSTMENT OF PMP FOR DRAINAGE AREA (%)[2]	6 HOURS	111		111	
	12 HOURS	123		123	
	24 HOURS	133		133	
	48 HOURS	142		142	
	72 HOURS	-		-	
	Zone 1				
SNYDER HYDROGRAPH PARAMETERS	ZONE[3]	11		11	
	C_p / C_t[4]	.62/1.50		.62/1.50	
	L (MILES)[5]	1.44		L^1=.25	
	L_{ca} (MILES)[5]	.68			
	$T_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	1.49		$C_t (L^1)^{0.6}$=.65	
SPILLWAY DATA	CREST LENGTH (FT.)		9	18	
	FREEBOARD (FT.)		1	2	
	DISCHARGE COEFFICIENT		3.3	2.7	
	EXPONENT		1.5	1.5	
	ELEVATION		1867	2001	
AREA[6] (ACRES)	NORMAL POOL			58.8	
	ELEV. _____			2020=100.1	
	ELEV. _____				
STORAGE (ACRE-FEET)	NORMAL POOL[7]	604.0		604.6	
	ELEV. _____[8]	0		1970.2=0	
	ELEV. _____[8]				
	ELEV _____[8]				

HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: LEWIS LAKE DAM RIVER BASIN: Susquehanna

PROBABLE MAXIMUM PRECIPITATION (PMP) = 21.2 INCHES/24 HOURS[1]

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		LEWIS LAKE	LEWIS LAKE DAM		
DRAINAGE AREA (SQUARE MILES)		5.0			
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		6.52	6.52		
ADJUSTMENT OF PMP FOR DRAINAGE AREA (%)[2]	6 HOURS	111			
	12 HOURS	123			
	24 HOURS	133			
	48 HOURS	142			
	72 HOURS	-			
	Zone 1				
SNYDER HYDROGRAPH PARAMETERS	ZONE[3]	11			
	C_p / C_t[4]	.62/1.50			
	L (MILES)[5]	6.98			
	L_{ca} (MILES)[5]	3.46			
	$T_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)	3.90			
SPILLWAY DATA	CREST LENGTH (FT.)		60		
	FREEBOARD (FT.)		4.4		
	DISCHARGE COEFFICIENT		2.7		
	EXPONENT		1.5		
	ELEVATION		1710		
AREA[6] (ACRES)	NORMAL POOL	48.7			
	ELEV. 1720	78.1			
	ELEV. 1740	143.3			
STORAGE (ACRE-FEET)	NORMAL POOL[7]	736.6			
	ELEV. 1664.6[8]	0			
	ELEV. ____[8]				
	ELEV ____[8]				

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.
L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

(6) Planimetered area encompased by contour upstream of dam.

(7) PennDER files.

(8) Computed by conic method.

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FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
**********************************
    1          A1       LEWIS LAKE DAM    ****    FIDDLE LAKE CREEK
    2          A2       HERRICK TWP., SUSQUEHANNA COUNTY, PA.
    3          A3       NDI # PA-00061        PA DER # 58-7
    4          B   300      0      15       0       0       0       0       0      -4       0
    5          B1    5
    6          J     1      9       1
    7          J1    1     .8     .65      .5      .4      .3      .2      .1     .05
    8          K              1                                       1
    9          K1                    INFLOW HYDROGRAPH - FIDDLE LAKE SUBAREA
   10          M     1        1     .42             6.52
   11          P             21.2    111     123     133     142
   12          T                                                     1     .05
   13          W    .65     .62
   14          X   -1.5    -.05       2
   15          K     1        2                                       1
   16          K1                    RESERVOIR ROUTING - THRU FIDDLE LAKE
   17          Y                             1
   18          Y1    1                                               604.6    -1
   19          Y4 2001     2002    2003    2004    2005
   20          Y5    0       52     159     719    1647
   21          $A    0     58.8   100.1
   22          $E1970.2     2001    2020
   23          $$ 2001
   24          $D 2003
   25          K     1        3                                       1
   26          K1                    ROUTING THRU REACH 2 - 3
   27          Y                             1
   28          Y1    1
   29          Y6   .1      .07      .1    1922    1960    3500   .0226
   30          Y7    0     1940      10    1940     240    1922     250    1922     480    1922
   31          Y7  490     1922     710    1940     900    1960
   32          K     1        4                                       1
   33          K1                    ROUTING THRU REACH 3 - 4
   34          Y                             1
   35          Y1    1
   36          Y6   .1      .05      .1    1890    1920    5200   .0062
   37          Y7    0     1920     120    1900     250    1890     255    1890    1020    1890
   38          Y7 1025     1890    1360    1900    1700    1920
   39          K     1        5                                       1
   40          K1                    ROUTING THRU REACH 4 - 5
   41          Y                             1
   42          Y1    1
   43          Y6   .1      .07      .08   1855    1900    5550   .0063
   44          Y7    0     1900     110    1880     270    1860     420    1855     430    1855
   45          Y7  550     1860    1060    1880    1370    1900
   46          K     1        6                                       1
   47          K1                    ROUTING THRU REACH 5 - 6
   48          Y                             1
   49          Y1    1
   50          Y6   .1      .09      .1    1841    1900    3600   .0039
1  51          Y7    0     1900      90    1880     160    1860     305    1841     315    1841
   52          Y7  470     1860     590    1880     740    1900
   53          K              7                                       1
   54          K1                    INFLOW HYDROGRAPH - LOWE LAKE SUBAREA
   55          M     1        1      1.1             6.52
   56          P             21.2    111     123     133     142
   57          T                                                     1     .05
   58          W    .65     .62
```

```
                T                                                    1    .05
                W  1.49    .62
                X  -1.5   -.05      2
                K     1      8                                       1
                K1                 RESERVOIR ROUTING - THRU LOWE LAKE
                Y                                  1
                Y1    1                                                  604.6    -1
                Y4 1867   1868    1869    1870    1871    1872
                Y5    0     30     359     945    2122    3778
                $A    0   47.8   118.5
                $E 1829   1867    1880
                $$ 1867
                $D 1868
                K     1      9                                       1
                K1                 ROUTING THRU REACH 8 - 9
                Y                                  1
                Y1    1
                Y6   .1    .06      .1    1826    1880    3350   .0122
                Y7    0   1880     170    1860     300    1840     385   1826     395   1826
                Y7  410   1840     670    1860    1240    1680
                K     2     10                                       1
                K1                 COMBINE HYDROGRAPHS
                K     1     11                                       1
                K1                 ROUTING THRU REACH 10 - 11
                Y                                  1
                Y1    1
                Y6   .1    .09      .1    1732    1780    4600   .0204
                Y7    0   1780     100    1760     400    1740     550   1732     560   1732
                Y7  600   1740     990    1760    1110    1780
                K            12                                       1
                K1                 INFLOW HYDROGRAPH - LEWIS LAKE SUBAREA
                M     1      1       5            6.52
                P            21.2    111     123     133     142
                T                                                    1    .05
                W   3.9    .62
                X  -1.5   -.05      2
                K     2     13                                       1
                K1                 COMBINE HYDROGRAPHS AT LEWIS LAKE
                K     1     14                                       1
                K1                 RESERVOIR ROUTING - THRU LEWIS LAKE
                Y                                  1
                Y1    1                                                  736.6    -1
                Y4 1710  1710.5    1711  1711.5    1712  1712.5    1713  1713.5    1714  1714.4
                Y4 1715   1716    1717    1718    1719    1720    1723
1               Y5    0     15      45      85     139     231     351    496      668   825
                Y5 1087   1602    2264    3337    4724    6374   12209
                $A    0   48.7    78.1   143.3
                $E1664.6  1710    1720    1740
                $$ 1710
                $D1714.4
                K     99

1                          PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                RUNOFF HYDROGRAPH AT          1
                                ROUTE HYDROGRAPH TO           2
                                ROUTE HYDROGRAPH TO           3
                                ROUTE HYDROGRAPH TO           4
                                ROUTE HYDROGRAPH TO           5
                                ROUTE HYDROGRAPH TO           6
                                RUNOFF HYDROGRAPH AT          7
                                ROUTE HYDROGRAPH TO           8
                                ROUTE HYDROGRAPH TO           9
```

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 97          Y                        1
 98          Y1    1                                           736.6      -1
 99          Y4 1710  1710.5  1711  1711.5   1712  1712.5   1713  1713.5   1714  1714.4
100          Y4 1715   1716   1717   1718   1719   1720   1723
101          Y5    0     15     45     85    139    231    351    496    668    825
102          Y5 1087   1602   2264   3337   4724   6374  12209
103          $A    0   48.7   78.1  143.3
104          $E1664.6  1710   1720   1740
105          $$ 1710
106          $D1714.4
107          K    99
1                          PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                   RUNOFF HYDROGRAPH AT           1
                                   ROUTE HYDROGRAPH TO            2
                                   ROUTE HYDROGRAPH TO            3
                                   ROUTE HYDROGRAPH TO            4
                                   ROUTE HYDROGRAPH TO            5
                                   ROUTE HYDROGRAPH TO            6
                                   RUNOFF HYDROGRAPH AT           7
                                   ROUTE HYDROGRAPH TO            8
                                   ROUTE HYDROGRAPH TO            9
                                   COMBINE  2 HYDROGRAPHS AT     10
                                   ROUTE HYDROGRAPH TO           11
                                   RUNOFF HYDROGRAPH AT          12
                                   COMBINE  2 HYDROGRAPHS AT     13
                                   ROUTE HYDROGRAPH TO           14
                                   END OF NETWORK


1*********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION     JULY 1978
  LAST MODIFICATION  26 FEB 79
*********************************

RUN  DATE* 80/07/01.
     TIME* 10.36.12.


                         LEWIS LAKE DAM    ****    FIDDLE LAKE CREEK
                         HERRICK TWP., SUSQUEHANNA COUNTY, PA.
                         NDI # PA-00061        PA DER # 58-7

                                          JOB SPECIFICATION
                NQ     NHR    NMIN    IDAY    IHR    IMIN   METRC    IPLT    IPRT   NSTAN
               300       0      15       0      0       0       0       0     PKJ

                                         5      0       0       0


                                        MULTI-PLAN ANALYSES TO BE PERFORMED
                                          NPLAN= 1 NRTIO= 9 LRTIO= 1
                    RTIOS=  1.00    .80    .65    .50    .40    .30    .20    .10    .05


          **********      **********      **********      **********      **********

                                           SUB-AREA RUNOFF COMPUTATION
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SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH - FIDDLE LAKE SUBAREA

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	.42	0.00	6.52	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.20	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= .65 CP= .62 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 15 END-OF-PERIOD ORDINATES, LAG= .65 HOURS, CP= .63 VOL= 1.00

54. 177. 250. 209. 136. 89. 58. 38. 25. 16.
11. 7. 5. 3. 2.

END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	24.08	21.70	2.38	24023.
										(612.)(551.)(61.)(680.26)			

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HYDROGRAPH ROUTING

RESERVOIR ROUTING - THRU FIDDLE LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSAK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	605.	-1

STAGE	2001.00	2002.00	2003.00	2004.00	2005.00
FLOW	0.00	52.00	159.00	719.00	1647.00
SURFACE AREA=	0.	59.	100.		

HYDROGRAPH ROUTING

RESERVOIR ROUTING - THRU FIDDLE LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	605.	-1

STAGE	2001.00	2002.00	2003.00	2004.00	2005.00
FLOW	0.00	52.00	159.00	719.00	1647.00
SURFACE AREA=	0.	59.	100.		
CAPACITY=	0.	604.	2096.		
ELEVATION=	1970.	2001.	2020.		

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
2001.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
2003.0	0.0	0.0	0.

PEAK OUTFLOW IS 1129. AT TIME 41.00 HOURS

PEAK OUTFLOW IS 796. AT TIME 41.25 HOURS

PEAK OUTFLOW IS 572. AT TIME 41.50 HOURS

PEAK OUTFLOW IS 365. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 220. AT TIME 42.25 HOURS

PEAK OUTFLOW IS 124. AT TIME 42.75 HOURS

PEAK OUTFLOW IS 70. AT TIME 42.75 HOURS

PEAK OUTFLOW IS 31. AT TIME 42.75 HOURS

PEAK OUTFLOW IS 16. AT TIME 42.75 HOURS

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HYDROGRAPH ROUTING

ROUTING THRU REACH 2 - 3

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
3	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.1000	.0700	.1000	1922.0	1960.0	3500.	.02260

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1940.00 40.00 1940.00 240.00 1922.00 250.00 1922.00 480.00 1922.00
490.00 1922.00 710.00 1940.00 900.00 1960.00

STORAGE	0.00	44.17	96.42	156.68	224.98	301.31	385.67	478.08	578.51	686.98
	802.61	921.28	1043.01	1167.79	1295.63	1426.52	1560.46	1697.45	1837.50	1980.60
OUTFLOW	0.00	2651.56	8772.99	17941.21	30105.44	45301.77	63602.21	85096.51	109864.09	138068.[illegible]
	171082.54	208101.72	248514.71	292283.92	339383.68	389797.21	443514.54	500531.12	560846.70	624464.60
STAGE	1922.00	1924.00	1926.00	1928.00	1930.00	1932.00	1934.00	1936.00	1938.00	1940.00
	1942.00	1944.00	1946.00	1948.00	1950.00	1952.00	1954.00	1956.00	1958.00	1960.00
FLOW	0.00	2651.56	8772.99	17941.21	30105.44	45301.77	63602.21	85096.51	109864.09	138069.[illegible]
	171082.54	208101.72	248514.71	292283.92	339383.68	389797.21	443514.54	500531.12	560846.70	624464.60

MAXIMUM STAGE IS 1922.8

MAXIMUM STAGE IS 1922.6

MAXIMUM STAGE IS 1922.4

MAXIMUM STAGE IS 1922.3

MAXIMUM STAGE IS 1922.2

MAXIMUM STAGE IS 1922.1

MAXIMUM STAGE IS 1922.1

MAXIMUM STAGE IS 1922.0

MAXIMUM STAGE IS 1922.0

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HYDROGRAPH ROUTING

ROUTING THRU REACH 3 - 4

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
4	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELINVT	ELMAX	RLNTH	SEL
.1000	.0500	.1000	1890.0	1920.0	5200.	.00620

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1920.00 120.00 1900.00 250.00 1890.00 255.00 1890.00 1020.00 1890.00
1025.00 1890.00 1360.00 1900.00 1700.00 1920.00

STORAGE	0.00	153.00	319.83	500.51	695.02	903.38	1125.57	1360.05	1601.76	1850.31
	2105.71	2367.96	2637.05	2912.99	3195.77	3485.39	3781.87	4085.18	4395.34	4712.35
OUTFLOW	0.00	3951.42	12729.27	25382.31	41583.03	61164.67	84033.72	110401.89	140006.56	172617.21
	208168.49	246610.21	287903.62	332018.57	378931.63	428624.81	481084.46	536300.59	594266.22	654976.90
STAGE	1890.00	1891.58	1893.16	1894.74	1896.32	1897.89	1899.47	1901.05	1902.63	1904.21
	1905.79	1907.37	1908.95	1910.53	1912.11	1913.68	1915.26	1916.84	1918.42	1920.00
FLOW	0.00	3951.42	12729.27	25382.31	41583.03	61164.67	84033.72	110401.89	140006.56	172617.21
	208168.49	246610.21	287903.62	332018.57	378931.63	428624.81	481084.46	536300.59	594266.22	654976.90

MAXIMUM STAGE IS 1890.4

MAXIMUM STAGE IS 1890.3

MAXIMUM STAGE IS 1890.2

MAXIMUM STAGE IS 1890.1

MAXIMUM STAGE IS 1890.1

MAXIMUM STAGE IS 1890.0

MAXIMUM STAGE IS 1890.0

MAXIMUM STAGE IS 1890.0

MAXIMUM STAGE IS 1890.0

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HYDROGRAPH ROUTING

ROUTING THRU REACH 4 - 5

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
5	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELMNT	ELMAX	RLNTH	SEL
.1000	.0700	.0800	1855.0	1900.0	5550.	.00630

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1900.00 110.00 1880.00 270.00 1860.00 420.00 1855.00 430.00 1855.00
550.00 1860.00 1060.00 1880.00 1370.00 1900.00

STORAGE	0.00	22.31	83.22	176.94	294.68	436.37	602.00	791.58	1005.09	1242.[illegible]
	1503.93	1788.41	2089.26	2405.12	2735.99	3081.86	3442.74	3818.63	4209.54	4615.[illegible]
OUTFLOW	0.00	346.88	2008.79	6331.65	13100.21	22410.02	34447.76	49404.78	67472.15	88838.[illegible]
	113689.93	142764.31	176195.48	213284.24	254081.99	298648.16	347047.63	399349.05	455623.71	515944.[illegible]
STAGE	1855.00	1857.37	1859.74	1862.11	1864.47	1866.84	1869.21	1871.58	1873.95	1876.[illegible]
	1878.68	1881.05	1883.42	1885.79	1888.16	1890.53	1892.89	1895.26	1897.63	1900.[illegible]
FLOW	0.00	346.88	2008.79	6331.65	13100.21	22410.02	34447.76	49404.78	67472.15	88838.[illegible]
	113689.93	142764.31	176195.48	213284.24	254081.99	298648.16	347047.63	399349.05	455623.71	515944.[illegible]

MAXIMUM STAGE IS 1858.3

MAXIMUM STAGE IS 1857.9

MAXIMUM STAGE IS 1857.6

MAXIMUM STAGE IS 1857.1

MAXIMUM STAGE IS 1856.3

MAXIMUM STAGE IS 1855.8

MAXIMUM STAGE IS 1855.4

MAXIMUM STAGE IS 1855.2

MAXIMUM STAGE IS 1855.1

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HYDROGRAPH ROUTING

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ROUTING THRU REACH 5 - 6

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
6	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.1000	.0900	.1000	1841.0	1900.0	3600.	.00390

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1900.00 90.00 1880.00 160.00 1860.00 305.00 1841.00 315.00 1841.00
470.00 1860.00 590.00 1880.00 740.00 1900.00

STORAGE	0.00	8.86	30.30	64.32	110.93	170.12	241.89	324.30	414.31	511.9
	617.05	729.78	850.08	978.14	1115.45	1262.32	1418.76	1584.76	1760.33	1945.
OUTFLOW	0.00	164.19	851.68	2326.95	4814.78	8516.93	13619.42	21632.10	31520.87	43156.
	56584.83	71852.76	89009.43	108019.98	128979.13	152095.04	177447.17	205114.27	235174.02	267702.
STAGE	1841.00	1844.11	1847.21	1850.32	1853.42	1856.53	1859.63	1862.74	1865.84	1868.
	1872.05	1875.16	1878.26	1881.37	1884.47	1887.58	1890.68	1893.79	1896.89	1900.
FLOW	0.00	164.19	851.68	2326.95	4814.78	8516.93	13619.42	21632.10	31520.87	43156.
	56584.83	71852.76	89009.43	108019.98	128979.13	152095.04	177447.17	205114.27	235174.02	267702.

MAXIMUM STAGE IS 1847.4

MAXIMUM STAGE IS 1846.4

MAXIMUM STAGE IS 1845.6

MAXIMUM STAGE IS 1844.8

MAXIMUM STAGE IS 1844.2

MAXIMUM STAGE IS 1843.1

MAXIMUM STAGE IS 1842.2

MAXIMUM STAGE IS 1841.6

MAXIMUM STAGE IS 1841.3

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SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH - LOWE LAKE SUBAREA

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
7	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	1.10	0.00	6.52	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.20	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 1.49 CP= .62 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 33 END-OF-PERIOD ORDINATES, LAG= 1.48 HOURS, CP= .63 VOL= 1.00

19.	71.	140.	213.	271.	301.	295.	257.	214.	179.
148.	123.	102.	85.	71.	59.	49.	41.	34.	28.
23.	19.	16.	13.	11.	9.	8.	6.	5.	4.
4.	3.	3.							

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	24.08	21.70	2.38	62334.
										(612.)	(551.)	(61.)	(1765.10)

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HYDROGRAPH ROUTING

RESERVOIR ROUTING - THRU LOWE LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
8	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	605.	-1

STAGE	1867.00	1868.00	1869.00	1870.00	1871.00	1872.00
FLOW	0.00	30.00	359.00	945.00	2122.00	3778.00

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RESERVOIR ROUTING - THRU LOWE LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
8	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IFMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	605.	-1

STAGE	1867.00	1868.00	1869.00	1870.00	1871.00	1872.00
FLOW	0.00	30.00	359.00	945.00	2122.00	3778.00
SURFACE AREA=	0.	48.	119.			
CAPACITY=	0.	605.	1652.			
ELEVATION=	1829.	1867.	1880.			

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1867.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1868.0	0.0	0.0	0.

PEAK OUTFLOW IS 2829. AT TIME 41.50 HOURS

PEAK OUTFLOW IS 2210. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 1770. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 1320. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 982. AT TIME 42.00 HOURS

PEAK OUTFLOW IS 709. AT TIME 42.25 HOURS

PEAK OUTFLOW IS 428. AT TIME 42.50 HOURS

PEAK OUTFLOW IS 167. AT TIME 43.00 HOURS

PEAK OUTFLOW IS 28. AT TIME 44.75 HOURS

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HYDROGRAPH ROUTING

ROUTING THRU REACH 8 - 9

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
9	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.1000	.0600	.1000	1826.0	1880.0	3350.	.01220

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1880.00 170.00 1860.00 300.00 1840.00 385.00 1826.00 395.00 1826.00
410.00 1840.00 670.00 1860.00 1240.00 1880.00

STORAGE	0.00	4.40	13.25	26.52	44.24	66.41	97.41	140.52	195.75	263.09
	342.54	434.10	537.79	659.42	804.03	971.63	1162.22	1375.79	1612.34	1871.8
OUTFLOW	0.00	233.24	1032.52	2617.06	5183.55	8969.79	15245.29	23432.98	33889.56	46903.0
	62737.59	81641.25	103758.21	127630.37	156454.41	190583.98	230434.73	276435.13	329010.57	388578.0
STAGE	1826.00	1828.84	1831.68	1834.53	1837.37	1840.21	1843.05	1845.89	1848.74	1851.5
	1854.42	1857.26	1860.11	1862.95	1865.79	1868.63	1871.47	1874.32	1877.16	1880.0
FLOW	0.00	233.24	1032.52	2617.06	5183.55	8969.79	15245.29	23432.98	33889.56	46903.0
	62737.59	81641.25	103758.21	127630.37	156454.41	190583.98	230434.73	276435.13	329010.57	388578.0

MAXIMUM STAGE IS 1834.8

MAXIMUM STAGE IS 1833.8

MAXIMUM STAGE IS 1833.0

MAXIMUM STAGE IS 1832.2

MAXIMUM STAGE IS 1831.5

MAXIMUM STAGE IS 1830.5

MAXIMUM STAGE IS 1829.5

MAXIMUM STAGE IS 1828.0

MAXIMUM STAGE IS 1826.3

COMBINE HYDROGRAPHS

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
10	2	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

ROUTING THRU REACH 10 - 11

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
11	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	0.	0

NORMAL DEPTH CHANNEL ROUTING

QN(1)	QN(2)	QN(3)	ELNVT	ELMAX	RLNTH	SEL
.1000	.0900	.1000	1732.0	1780.0	4600.	.02040

CROSS SECTION COORDINATES--STA,ELEV,STA,ELEV--ETC
0.00 1780.00 100.00 1760.00 400.00 1740.00 550.00 1732.00 560.00 1732.00
600.00 1740.00 990.00 1760.00 1110.00 1780.00

STORAGE	0.00	10.67	37.35	80.03	141.24	225.60	333.21	464.06	616.19	795.5
	996.18	1220.06	1460.53	1708.47	1963.82	2226.59	2496.77	2774.36	3059.37	3351.7
OUTFLOW	0.00	304.30	1624.60	4492.52	10311.39	19162.42	31445.77	47646.82	68213.50	93568.3
	124114.54	160239.03	205681.68	257000.60	313758.71	375884.34	443334.53	516087.16	594135.72	677485.6
STAGE	1732.00	1734.53	1737.05	1739.58	1742.11	1744.63	1747.16	1749.68	1752.21	1754.7
	1757.26	1759.79	1762.32	1764.84	1767.37	1769.89	1772.42	1774.95	1777.47	1780.0
FLOW	0.00	304.30	1624.60	4492.52	10311.39	19162.42	31445.77	47646.82	68213.50	93568.
	124114.54	160239.03	205681.68	257000.60	313758.71	375884.34	443334.53	516087.16	594135.72	677485.6

MAXIMUM STAGE IS 1738.8

MAXIMUM STAGE IS 1738.0

MAXIMUM STAGE IS 1737.5

M JM STAGE IS 1736.8

MAXIMUM STAGE IS 1736.0

MAXIMUM STAGE IS 1735.4

MAXIMUM STAGE IS 1735.4

MAXIMUM STAGE IS 1734.8

MAXIMUM STAGE IS 1733.6

MAXIMUM STAGE IS 1732.4

14/24

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SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH - LEWIS LAKE SUBAREA

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
12	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	5.00	0.00	6.52	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.20	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA

TP= 3.90 CP= .62 NTA= 0

RECESSION DATA

STRTQ= -1.50 QRCSN= -.05 RTIOR= 2.00

UNIT HYDROGRAPH 86 END-OF-PERIOD ORDINATES, LAG= 3.88 HOURS, CP= .62 VOL= 1.00

9.	33.	67.	107.	152.	200.	250.	302.	355.	404.
446.	480.	506.	524.	534.	535.	524.	498.	465.	434.
405.	378.	353.	329.	307.	287.	268.	250.	233.	218.
203.	190.	177.	165.	154.	144.	134.	125.	117.	109.
102.	95.	89.	83.	77.	72.	67.	63.	59.	55.
51.	48.	45.	42.	39.	36.	34.	32.	30.	28.
26.	24.	22.	21.	20.	18.	17.	16.	15.	14.
13.	12.	11.	10.	10.	9.	9.	8.	7.	7.
6.	6.	6.	5.	5.	5.				

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q
									SUM	24.08	21.70	2.38	279825.
										(612.)	(551.)	(61.)	(7923.76)

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COMBINE HYDROGRAPHS

15/34

COMBINE HYDROGRAPHS AT LEWIS LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
13	2	0	0	0	0	1	0	0

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HYDROGRAPH ROUTING

RESERVOIR ROUTING - THRU LEWIS LAKE

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
14	1	0	0	0	0	1	0	0

ROUTING DATA

GLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	737.	-1

STAGE	1710.00	1710.50	1711.00	1711.50	1712.00	1712.50	1713.00	1713.50	1714.00	1714.40
	1715.00	1716.00	1717.00	1718.00	1719.00	1720.00	1723.00			
FLOW	0.00	15.00	45.00	85.00	139.00	231.00	351.00	496.00	668.00	825.00
	1087.00	1602.00	2264.00	3337.00	4724.00	6374.00	12209.00			
SURFACE AREA=	0.	49.	78.	143.						
CAPACITY=	0.	737.	1365.	3547.						
ELEVATION=	1665.	1710.	1720.	1740.						

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1710.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1714.4	0.0	0.0	0.

PEAK OUTFLOW IS 11141. AT TIME 43.50 HOURS

PEAK OUTFLOW IS 8877. AT TIME 43.50 HOURS

PEAK OUTFLOW IS 7126. AT TIME 43.50 HOURS

PEAK OUTFLOW IS 5336. AT TIME 43.75 HOURS

PEAK OUTFLOW IS 4153. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 2988. AT TIME 44.00 HOURS

PEAK OUTFLOW IS 1816. AT TIME 44.50 HOURS

PEAK OUTFLOW IS 282. AT TIME 46.50 HOURS

16/34

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1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 .80	RATIO 3 .65	RATIO 4 .50	RATIO 5 .40	RATIO 6 .30	RATIO 7 .20	RATIO 8 .10	RATIO 9 .05
HYDROGRAPH AT	1	.42	1	1769.	1415.	1150.	884.	708.	531.	354.	177.	88.
	(	1.09)	(	50.09)(	40.07)(	32.56)(	25.05)(	20.04)(	15.03)(	10.02)(	5.01)(	2.5(
ROUTED TO	2	.42	1	1129.	796.	572.	365.	220.	124.	70.	31.	1(
	(	1.09)	(	31.98)(	22.54)(	16.19)(	10.34)(	6.23)(	3.50)(	1.98)(	.88)(	.44)
ROUTED TO	3	.42	1	1109.	784.	567.	362.	218.	123.	70.	31.	1(
	(	1.09)	(	31.40)(	22.19)(	16.04)(	10.26)(	6.18)(	3.49)(	1.97)(	.87)(	.44)
ROUTED TO	4	.42	1	1029.	735.	541.	347.	208.	121.	68.	31.	1(
	(	1.09)	(	29.13)(	20.82)(	15.31)(	9.82)(	5.89)(	3.43)(	1.93)(	.87)(	.43
ROUTED TO	5	.42	1	976.	701.	515.	315.	189.	116.	66.	30.	1(
	(	1.09)	(	27.62)(	19.86)(	14.58)(	8.91)(	5.35)(	3.29)(	1.85)(	.84)(	.42
ROUTED TO	6	.42	1	951.	682.	500.	307.	183.	113.	64.	29.	1(
	(	1.09)	(	26.93)(	19.32)(	14.17)(	8.70)(	5.17)(	3.21)(	1.81)(	.83)(	.42
HYDROGRAPH AT	7	1.10	1	3068.	2455.	1994.	1534.	1227.	921.	614.	307.	15
	(	2.85)	(	86.89)(	69.51)(	56.48)(	43.44)(	34.75)(	26.07)(	17.38)(	8.69)(	4.34
ROUTED TO	8	1.10	1	2829.	2210.	1770.	1320.	982.	709.	428.	167.	28
	(	2.85)	(	80.12)(	62.57)(	50.11)(	37.38)(	27.81)(	20.07)(	12.13)(	4.74)(	.7
ROUTED TO	9	1.10	1	2823.	2208.	1764.	1318.	979.	706.	427.	166.	2
	(	2.85)	(	79.95)(	62.52)(	49.96)(	37.32)(	27.74)(	20.00)(	12.08)(	4.71)(	.79
2 COMBINED	10	1.52	1	3597.	2723.	2106.	1483.	1082.	781.	472.	192.	4
	(	3.94)	(	101.86)(	77.10)(	59.63)(	42.00)(	30.64)(	22.11)(	13.38)(	5.43)(	1.2
ROUTED TO	11	1.52	1	3576.	2711.	2096.	1473.	1074.	776.	469.	189.	4
	(	3.94)	(	101.26)(	76.78)(	59.34)(	41.70)(	30.41)(	21.96)(	13.27)(	5.31)(	1.2
HYDROGRAPH AT	12	5.00	1	8211.	6569.	5337.	4106.	3284.	2463.	1642.	821.	41
	(	12.95)	(	232.52)(	186.01)(	151.13)(	116.26)(	93.01)(	69.75)(	46.50)(	23.25)(	11.6
2 COMBINED	13	6.52	1	11405.	9080.	7306.	5508.	4333.	3224.	2108.	1004.	44
	(	16.89)	(	322.97)(	257.12)(	206.88)(	155.98)(	122.71)(	91.28)(	59.70)(	28.44)(	12.4
ROUTED TO	14	6.52	1	11141.	8877.	7126.	5336.	4153.	2988.	1816.	773.	2
	(	16.89)	(	315.49)(	251.36)(	201.80)(	151.09)(	117.61)(	84.61)(	51.43)(	21.89)(	7.9

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2001.01	2001.00	2003.00
STORAGE	604.	604.	725.
OUTFLOW	1.	0.	159.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	2004.44	1.44	817.	1129.	6.50	41.00	0.00
.80	2004.08	1.08	794.	796.	5.50	41.25	0.00
.65	2003.74	.74	772.	572.	4.50	41.50	0.00
.50	2003.37	.37	748.	365.	3.50	41.75	0.00
.40	2003.11	.11	732.	220.	2.00	42.25	0.00
.30	2002.67	0.00	705.	124.	0.00	42.75	0.00
.20	2002.17	0.00	674.	70.	0.00	42.75	0.00
.10	2001.60	0.00	639.	31.	0.00	42.75	0.00
.05	2001.30	0.00	621.	16.	0.00	42.75	0.00

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1109.	1922.8	41.25
.80	784.	1922.6	41.50
.65	567.	1922.4	41.75
.50	362.	1922.3	42.00
.40	218.	1922.2	42.50
.30	123.	1922.1	42.75
.20	70.	1922.1	43.00
.10	31.	1922.0	43.00
.05	16.	1922.0	43.00

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	1029.	1890.4	41.75
.80	735.	1890.3	42.00
.65	541.	1890.2	42.25
.50	347.	1890.1	42.50
.40	208.	1890.1	43.00
.30	121.	1890.0	43.25
.20	68.	1890.0	43.50
.10	31.	1890.0	43.50
.05	15.	1890.0	43.50

PLAN 1 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	976.	1858.3	42.25
.80	701.	1857.9	42.50

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	974.	1858.3	42.25
.80	701.	1857.9	42.50
.65	515.	1857.6	42.75
.50	315.	1857.1	43.25
.40	189.	1856.3	43.50
.30	116.	1855.8	44.25
.20	66.	1855.4	44.25
.10	30.	1855.2	44.50
.05	15.	1855.1	44.50

PLAN 1 STATION 6

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	951.	1847.4	42.75
.80	682.	1846.4	43.00
.65	500.	1845.6	43.25
.50	307.	1844.8	43.75
.40	183.	1844.2	44.25
.30	113.	1843.1	45.00
.20	64.	1842.2	45.00
.10	29.	1841.6	45.25
.05	15.	1841.3	45.25

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1864.95	1867.00	1868.00
STORAGE	603.	605.	655.
OUTFLOW	0.	0.	30.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1871.43	3.43	861.	2829.	22.25	41.50	0.00
.80	1871.05	3.05	836.	2210.	20.75	41.75	0.00
.65	1870.70	2.70	813.	1770.	19.00	41.75	0.00
.50	1870.32	2.32	789.	1320.	16.75	41.75	0.00
.40	1870.03	2.03	771.	982.	15.50	42.00	0.00
.30	1869.60	1.60	744.	709.	13.75	42.25	0.00
.20	1869.12	1.12	716.	428.	11.75	42.50	0.00
.10	1868.42	.42	678.	167.	8.00	43.00	0.00
.05	1867.93	0.00	652.	28.	0.00	44.75	0.00

PLAN 1 STATION 9

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	2823.	1834.8	41.75
.80	2208.	1833.8	41.75
.65	1744.	1833.0	41.75

PLAN 1 STATION 9

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	2823.	1834.8	41.75
.80	2208.	1833.8	41.75
.65	1764.	1833.0	41.75
.50	1318.	1832.2	42.00
.40	979.	1831.5	42.25
.30	706.	1830.5	42.25
.20	427.	1829.5	42.75
.10	166.	1828.0	43.25
.05	28.	1826.3	45.00

PLAN 1 STATION 11

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
1.00	3576.	1738.8	42.25
.80	2711.	1738.0	42.25
.65	2096.	1737.5	42.50
.50	1473.	1736.8	42.50
.40	1074.	1736.0	42.75
.30	776.	1735.4	42.75
.20	469.	1734.8	43.00
.10	188.	1733.6	44.00
.05	42.	1732.4	45.75

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1709.98	1710.00	1714.40
STORAGE	736.	737.	977.
OUTFLOW	0.	0.	825.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1722.45	8.05	1565.	11141.	18.00	43.50	0.00
.80	1721.29	6.89	1468.	8277.	16.50	43.50	0.00
.65	1720.39	5.99	1396.	7126.	15.25	43.50	0.00
.50	1719.37	4.97	1317.	5336.	13.75	43.75	0.00
.40	1718.59	4.19	1259.	4153.	12.50	44.00	0.00
.30	1717.67	3.27	1192.	2988.	10.50	44.00	0.00
.20	1716.32	1.92	1100.	1816.	8.00	44.50	0.00
.10	1714.27	0.00	969.	773.	0.00	45.50	0.00
.05	1712.71	0.00	879.	282.	0.00	46.50	0.00

JOB WAITING.
SYSTEM HUNG - PLEASE STAND BY

80/07/01. 11.40.13.
ENSI 7400.N0460.63AB 80/06/29.DS-3 11.39.46. 80/07/01.
USER NUMBER?
[illegible] TIME OUT.

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*** ************************
    1          A1       LEWIS LOWE DAM    ****    FIDDLE LAKE CREEK
    2          A2       HERRICK TWP., SUSQUEHANNA COUNTY, PA.
    3          A3       NDI # PA-00061        PA DER # 58-7
    4          B   300      0      15       0       0       0       0       0      -4       0
    5          B1    5
    6          J     5      1       1
    7          J1  .13
    8          K             1                                              1
    9          K1                  INFLOW HYDROGRAPH - FIDDLE LAKE SUBAREA
   10          M     1       1     .42             6.52                                    1
   11          P           21.2     111     123     133     142
   12          T                                                      1     .05
   13          W   .65     .62
   14          X  -1.5     -.05      2
   15          K     1       2                                        1
   16          K1                  RESERVOIR ROUTING - THRU FIDDLE LAKE
   17          Y                                 1       1
   18          Y1    1                                                        604.6     -1
   19          Y4 2001    2002    2003    2004    2005
   20          Y5    0      52     159     719    1647
   21          $$    0    58.8   100.1
   22          $E1970.2    2001    2020
   23          $$ 2001
   24          $D 2003
   25          K     1       3                                        1
   26          K1                  ROUTING THRU REACH 2 - 3
   27          Y                                 1       1
   28          Y1    1
   29          Y6   .1     .07      .1    1922    1960    3300   .0226
   30          Y7    0    1940      10    1940     240    1922     250    1922     480    1922
   31          Y7  490    1922     710    1940     900    1960
   32          K     1       4                                        1
   33          K1                  ROUTING THRU REACH 3 - 4
   34          Y                                 1       1
   35          Y1    1
   36          Y6   .1     .05      .1    1890    1920    5200   .0062
   37          Y7    0    1920     120    1900     250    1890     255    1890    1020    1890
   38          Y7 1025    1890    1360    1900    1700    1920
   39          K     1       5                                        1
   40          K1                  ROUTING THRU REACH 4 - 5
   41          Y                                 1       1
   42          Y1    1
   43          Y6   .1     .07      .08   1855    1900    5550   .0063
   44          Y7    0    1900     110    1890     270    1860     420    1855     430    1855
   45          Y7  550    1860    1060    1880    1370    1900
   46          K     1       6                                        1
   47          K1                  ROUTING THRU REACH 5 - 6
   48          Y                                 1       1
   49          Y1    1
   50          Y6   .1     .09      .1    1841    1700    3600   .0039
1  51          Y7    0    1900      90    1890     160    1860     305    1841     315    1841
   52          Y7  470    1860     590    1880     740    1900
   53          K             7                                              1
   54          K1                  INFLOW HYDROGRAPH - LOWE LAKE SUBAREA
   55          M     1       1     1.1             6.52                                    1
   56          P           21.2     111     123     133     142
   57          T                                                      1     .05
   58          W  1.49     .62
   59          X  -1.5     -.05      2
   60          K     1       8                                        1
   61          K1                  RESERVOIR ROUTING - THRU LOWE LAKE
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      KI                RESERVOIR ROUTING - THRU LOWE LAKE
 62   Y                                1       1
 63   Y1    1                                                  604.6     -1
 64   Y4  1867    1868    1869    1870    1871    1872
 65   Y5     0      30     359     945    2122    3778
 66   $A     0    47.8   118.5
 67   $E  1639    1867    1880
 68   $$  1867
 69   $D  1868
 70   K      1       9                                                1
 71   KI                ROUTING THRU REACH 8 - 9
 72   Y                                1       1
 73   Y1     1
 74   Y6    .1     .06      .1    1826    1880    3350   .0122
 75   Y7     0    1880     170    1860     300    1840     385    1826     395    1826
 76   Y7   410    1840     670    1860    1240    1880
 77   K      2      10                                                1
 78   KI                COMBINE HYDROGRAPHS
 79   K      1      11                                                1
 80   KI                ROUTING THRU REACH 10 - 11
 81   Y                                1       1
 82   Y1     1
 83   Y6    .1     .09      .1    1732    1780    4600   .0204
 84   Y7     0    1780     100    1760     400    1740     550    1732     560    1732
 85   Y7   600    1740     990    1760    1110    1780
 86   K             12                                                1
 87   KI                INFLOW HYDROGRAPH - LEWIS LAKE SUBAREA
 88   H      1       1        5            6.52                                  1
 89   P             21.2     111     123     133     142
 90   T                                                              1     .05
 91   W    3.9     .62
 92   X   -1.5    -.05        2
 93   K      2      13                                                1
 94   KI                COMBINE HYDROGRAPHS AT LEWIS LAKE
 95   K      1      14                                                1
 96   KI                RESERVOIR ROUTING - THRU LEWIS LAKE
 97   Y                                1       1
 98   Y1     1                                                  736.6     -1
 99   Y4  1710  1710.5    1711  1711.5    1712  1712.5    1713  1713.5    1714  1714.4
100   Y4  1715    1716    1717    1718    1719    1720    1723
101   Y5     0      15      45      95     139     231     351     496     668     825
102   Y5  1087    1602    2264    3337    4724    6374   12209
103   $A     0    48.7    78.1   143.3
104   $E1664.6    1710    1720    1740
105   $$  1710
106   $D1714.4
107   $R    50       1    1704     .25    1710    1800
108   $R    50       1    1704     .25    1710  1714.9
109   $R    50       1    1704      .5    1710  1714.9
110   $R    50       1    1704       1    1710  1714.9
111   $R    50       1    1704       2    1710  1714.9
112   K      1      15                                                1
113   KI                ROUTING THRU REACH 14 - 15
114   Y                                1       1
115   Y1     1
116   Y6    .1     .08      .1    1678    1720     850   .026
117   Y7     0    1720     120    1700     200    1680     205    1678     215    1678
118   Y7   230    1680     290    1700     340    1720
119   K     99

1                 PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS
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[illegible]	Y7	0	1720	120	1700	200	1680	205	1678	215	1678
118	Y7	240	1680	290	1700	340	1720				
119	K	99									

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1. PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

RUNOFF HYDROGRAPH AT	1
ROUTE HYDROGRAPH TO	2
ROUTE HYDROGRAPH TO	3
ROUTE HYDROGRAPH TO	4
ROUTE HYDROGRAPH TO	5
ROUTE HYDROGRAPH TO	6
RUNOFF HYDROGRAPH AT	7
ROUTE HYDROGRAPH TO	8
ROUTE HYDROGRAPH TO	9
COMBINE 2 HYDROGRAPHS AT	10
ROUTE HYDROGRAPH TO	11
RUNOFF HYDROGRAPH AT	12
COMBINE 2 HYDROGRAPHS AT	13
ROUTE HYDROGRAPH TO	14
ROUTE HYDROGRAPH TO	15
END OF NETWORK	

1**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 25 FEB 79
****

RUN DATE= 05/07/81.
TIME= 13.53.55.

LEWIS LAKE DAM **** FIDDLE LAKE CREEK
HERRICK TWP., SUSQUEHANNA COUNTY, PA.
NDI # PA-00061 PA DER # 58-7

JOB SPECIFICATION

NO	NHR	NMIN	IPAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	15	0	0	0	0	0	-4	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 5 NRTIO= 1 LRTIO= 1

RTIOS= .13

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH - FIDDLE LAKE SUBAREA

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL

********** ********** ********** ********** **********

1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 .13
HYDROGRAPH AT	1	.42	1	230.
		(1.09)		(6.51)(
			2	230.
				(6.51)(
			3	230.
				(6.51)(
			4	230.
				(6.51)(
			5	230.
				(6.51)(
ROUTED TO	2	.42	1	40.
		(1.09)		(1.14)(
			2	40.
				(1.14)(
			3	40.
				(1.14)(
			4	40.
				(1.14)(
			5	40.
				(1.14)(
ROUTED TO	3	.42	1	40.
		(1.09)		(1.13)(
			2	40.
				(1.13)(
			3	40.
				(1.13)(
			4	40.
				(1.13)(
			5	40.
				(1.13)(
ROUTED TO	4	.42	1	40.
		(1.09)		(1.12)(
			2	40.
				(1.12)(
			3	40.
				(1.12)(
			4	40.
				(1.12)(
			5	40.
				1.12)(

ROUTED TO	5	.42	1	39.
	(	1.09)	(	1.09)(
			2	39.
			(	1.09)(
			3	39.
			(	1.09)(
			4	39.
			(	1.09)(
			5	39.
			(	1.09)(
ROUTED TO	6	.42	1	38.
	(	1.09)	(	1.08)(
			2	38.
			(	1.08)(
			3	38.
			(	1.08)(
			4	38.
			(	1.08)(
			5	38.
			(	1.08)(
HYDROGRAPH AT	7	1.10	1	399.
	(	2.85)	(	11.30)(
			2	399.
			(	11.30)(
			3	399.
			(	11.30)(
			4	399.
			(	11.30)(
			5	399.
			(	11.30)(
ROUTED TO	8	1.10	1	243.
	(	2.85)	(	6.87)(
			2	243.
			(	6.87)(
			3	243.
			(	6.87)(
			4	243.
			(	6.87)(
			5	243.
			(	6.87)(
ROUTED TO	9	1.10	1	243.
	(	2.85)	(	6.87)(
			2	243.
			(	6.87)(
			3	243.
			(	6.87)(
			4	243.
			(	6.87)(
			5	243.
			(	6.87)(
2 COMBINED	10	1.52	1	273.
	(	3.94)	(	7.74)(
			2	273.
			(	7.74)(
			3	273.
			(	7.74)(

2 COMBINED	10	1.52	1	273.
		(3.94)		(7.74)(
			2	273.
				(7.74)(
			3	273.
				(7.74)(
			4	273.
				(7.74)(
			5	273.
				(7.74)(
ROUTED TO	11	1.52	1	267.
		(3.94)		(7.57)(
			2	267.
				(7.57)(
			3	267.
				(7.57)(
			4	267.
				(7.57)(
			5	267.
				(7.57)(
HYDROGRAPH AT	12	5.00	1	1067.
		(12.95)		(30.23)(
			2	1067.
				(30.23)(
			3	1067.
				(30.23)(
			4	1067.
				(30.23)(
			5	1067.
				(30.23)(
2 COMBINED	13	6.52	1	1333.
		(16.89)		(37.76)(
			2	1333.
				(37.76)(
			3	1333.
				(37.76)(
			4	1333.
				(37.76)(
			5	1333.
				(37.76)(
ROUTED TO	14	6.52	1	1079.
		(16.89)		(30.57)(
			2	6540.
				(185.19)(
			3	5731.
				(162.28)(
			4	4575.
				(129.54)(
			5	3251.
				(92.06)(
ROUTED TO	15	6.52	1	1079.
		(16.89)		(30.56)(
			2	5770.
				(163.39)(
			3	5101.
				(144.47)(

			(92.06)(	
ROUTED TO	15	6.52	1	1079.
	(	16.89)	(30.56)(	
			2	5770.
			(163.39)(	
			3	5601.
			(158.59)(	
			4	4538.
			(128.50)(	
			5	3238.
			(91.70)(	

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2001.01	2001.00	2003.00
STORAGE	604.	604.	725.
OUTFLOW	1.	0.	159.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	2001.77	0.00	650.	40.	0.00	42.75	0.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2001.01	2001.00	2003.00
STORAGE	604.	604.	725.
OUTFLOW	1.	0.	159.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	2001.77	0.00	650.	40.	0.00	42.75	0.00

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2001.01	2001.00	2003.00
STORAGE	604.	604.	725.
OUTFLOW	1.	0.	159.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	2001.77	0.00	650.	40.	0.00	42.75	0.00

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2001.01	2001.00	2003.00
STORAGE	604.	604.	725.
OUTFLOW	1.	0.	159.

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2001.01	2001.00	2003.00
STORAGE	604.	604.	725.
OUTFLOW	1.	0.	159.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	2001.77	0.00	650.	40.	0.00	42.75	0.00

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	2001.01	2001.00	2003.00
STORAGE	604.	604.	725.
OUTFLOW	1.	0.	159.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	2001.77	0.00	650.	40.	0.00	42.75	0.00

PLAN 1 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	40.	1922.0	43.00

PLAN 2 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	40.	1922.0	43.00

PLAN 3 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	40.	1922.0	43.00

PLAN 4 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	40.	1922.0	43.00

PLAN 5 STATION 3

PLAN 5 STATION 3

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	40.	1922.0	43.00

PLAN 1 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	40.	1890.0	43.50

PLAN 2 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	40.	1890.0	43.50

PLAN 3 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	40.	1890.0	43.50

PLAN 4 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	40.	1890.0	43.50

PLAN 5 STATION 4

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	40.	1890.0	43.50

PLAN 1 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	39.	1855.3	44.50

PLAN 2 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	39.	1855.3	44.50

.13	39.	1855.3	44.50

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PLAN 3 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	39.	1855.3	44.50

PLAN 4 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	39.	1855.3	44.50

PLAN 5 STATION 5

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	39.	1855.3	44.50

PLAN 1 STATION 6

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	38.	1841.7	45.25

PLAN 2 STATION 6

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	38.	1841.7	45.25

PLAN 3 STATION 6

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	38.	1841.7	45.25

PLAN 4 STATION 6

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	38.	1841.7	45.25

PLAN 5 STATION 6

PLAN 5 STATION 6

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RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	38.	1841.7	45.25

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1866.95	1867.00	1868.00
STORAGE	603.	605.	655.
OUTFLOW	0.	0.	30.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	1868.65	.65	690.	243.	9.50	42.75	0.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1866.95	1867.00	1868.00
STORAGE	603.	605.	655.
OUTFLOW	0.	0.	30.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	1868.65	.65	690.	243.	9.50	42.75	0.00

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1866.95	1867.00	1868.00
STORAGE	603.	605.	655.
OUTFLOW	0.	0.	30.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	1868.65	.65	690.	243.	9.50	42.75	0.00

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1866.95	1867.00	1868.00
STORAGE	603.	605.	655.
OUTFLOW	0.	0.	30.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	1868.65	.65	690.	243.	9.50	42.75	0.00

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1866.95	1867.00	1868.00
STORAGE	603.	605.	655.
OUTFLOW	0.	0.	30.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	1868.65	.65	690.	243.	9.50	42.75	0.00

PLAN 1 STATION 9

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	243.	1828.9	43.00

PLAN 2 STATION 9

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	243.	1828.9	43.00

PLAN 3 STATION 9

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	243.	1828.9	43.00

PLAN 4 STATION 9

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	243.	1828.9	43.00

PLAN 5 STATION 9

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	243.	1828.9	43.00

PLAN 1 STATION 11

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	243.	1828.9	43.00

PLAN 2 STATION 11

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	267.	1734.2	43.75

PLAN 3 STATION 11

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	267.	1734.2	43.75

PLAN 4 STATION 11

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	267.	1734.2	43.75

PLAN 5 STATION 11

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	267.	1734.2	43.75

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1710.00	1710.00	1714.40
STORAGE	737.	737.	977.
OUTFLOW	0.	0.	825.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	1714.98	.58	1013.	1079.	4.25	45.00	0.00

PLAN 2 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1710.00	1710.00	1714.40
STORAGE	737.	737.	977.
OUTFLOW	0.	0.	825.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	1714.93	.53	1010.	6540.	1.47	44.75	44.50

..... INITIAL VALUE SPILLWAY CREST TOP OF DAM

.13 1714.73 .53 1010. 5340. 1.47 44.75 44.50

PLAN 3 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1710.00	1710.00	1714.40
STORAGE	737.	737.	977.
OUTFLOW	0.	0.	825.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	1714.93	.53	1010.	5731.	1.58	45.00	44.50

PLAN 4 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1710.00	1710.00	1714.40
STORAGE	737.	737.	977.
OUTFLOW	0.	0.	825.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	1714.93	.53	1010.	4575.	1.75	45.50	44.50

PLAN 5 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1710.00	1710.00	1714.40
STORAGE	737.	737.	977.
OUTFLOW	0.	0.	825.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.13	1714.93	.53	1010.	3251.	2.00	46.50	44.50

PLAN 1 STATION 15

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	1079.	1682.8	45.25

PLAN 2 STATION 15

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	5770.	1688.6	44.75

PLAN 3 STATION 15

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS

PLAN 3 STATION 15

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	5601.	1688.5	45.00

PLAN 4 STATION 15

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	4538.	1687.5	45.50

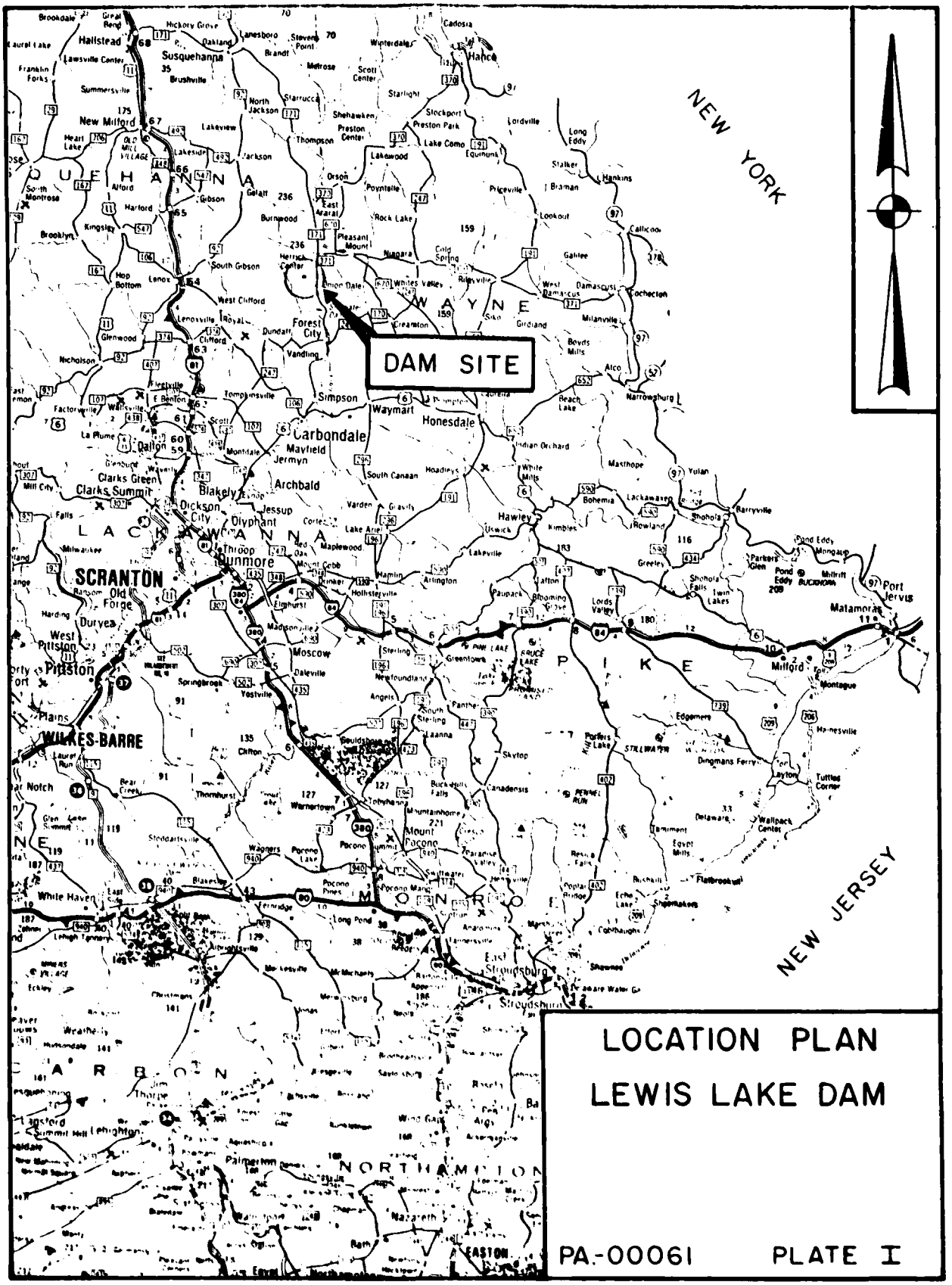
PLAN 5 STATION 15

RATIO	MAXIMUM FLOW,CFS	MAXIMUM STAGE,FT	TIME HOURS
.13	3238.	1686.1	46.50

EOI ENCOUNTERED.

APPENDIX E

PLATES

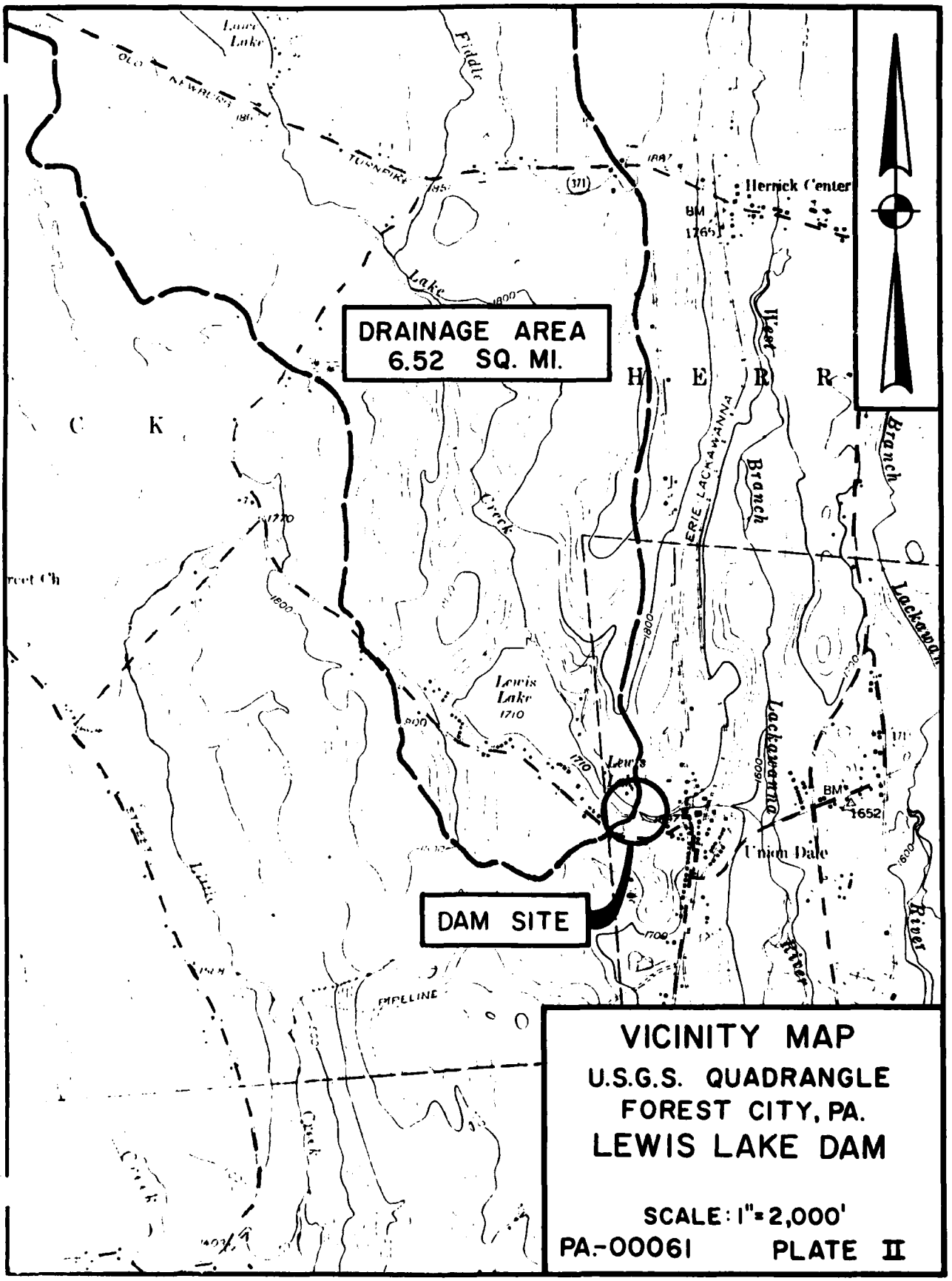


LOCATION PLAN
LEWIS LAKE DAM

PA-00061 PLATE I

AD-A091 595 BERGER ASSOCIATES INC HARRISBURG PA F/G 13/13
NATIONAL DAM INSPECTION PROGRAM. LEWIS LAKE DAM (NDI-ID NUMBER --ETC(U)
AUG 80 H JONGSMA DACW31-80-C-0019
UNCLASSIFIED NL

END
DATE FILMED
12 80
DTIC



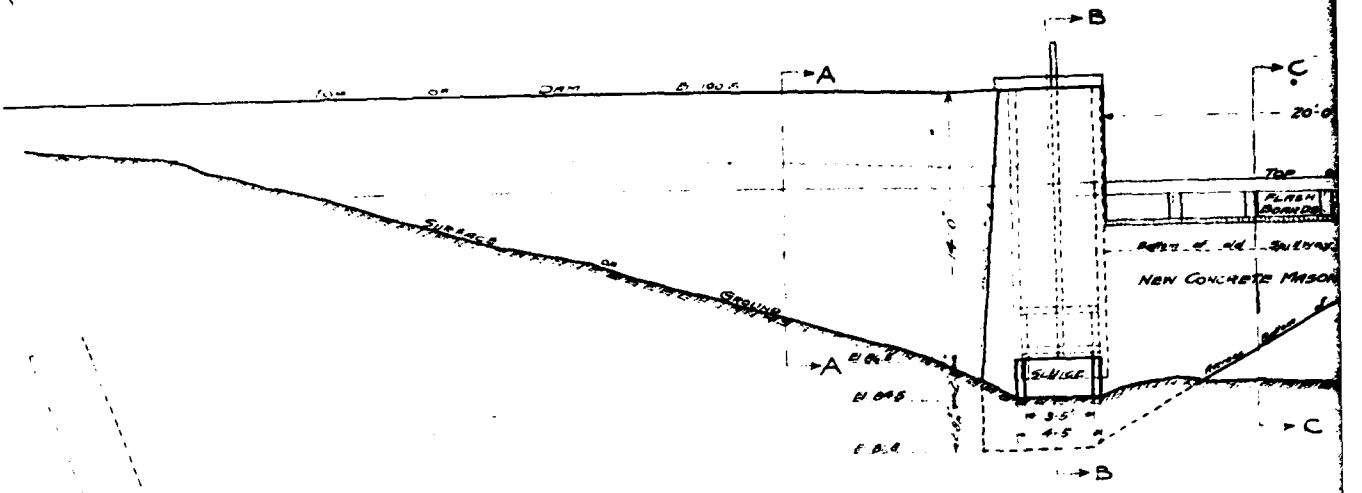
VICINITY MAP

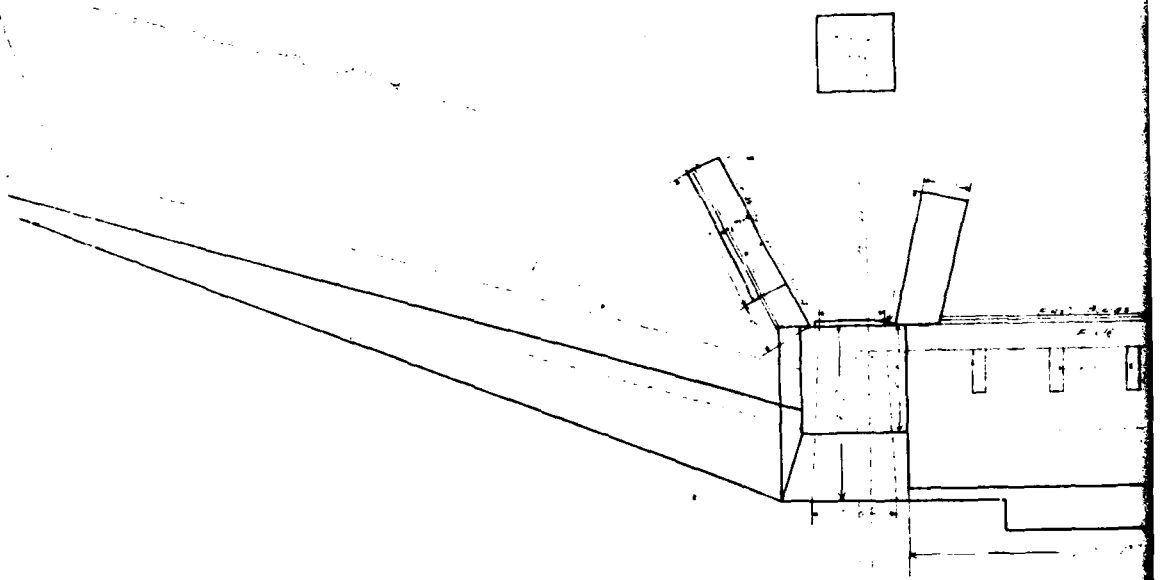
U.S.G.S. QUADRANGLE
FOREST CITY, PA.

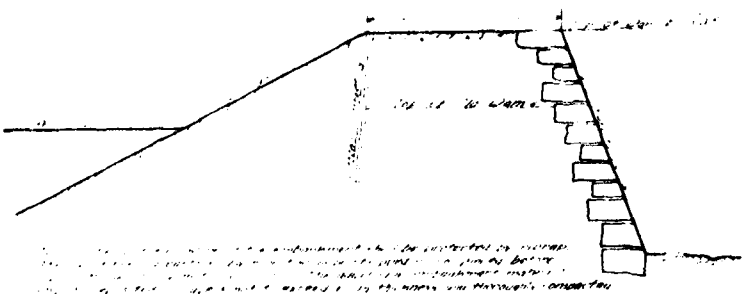
LEWIS LAKE DAM

SCALE: 1"=2,000'

PA-00061 PLATE II


B
A
C
20'-0
TOP
NEW CONCRETE MASON
SLUICE
A
B
C
B
ELEVATION.


PLAN.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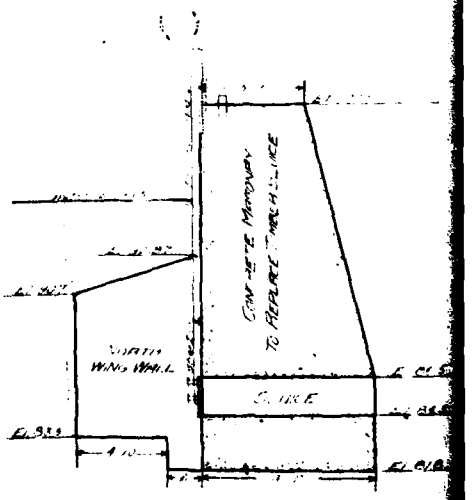
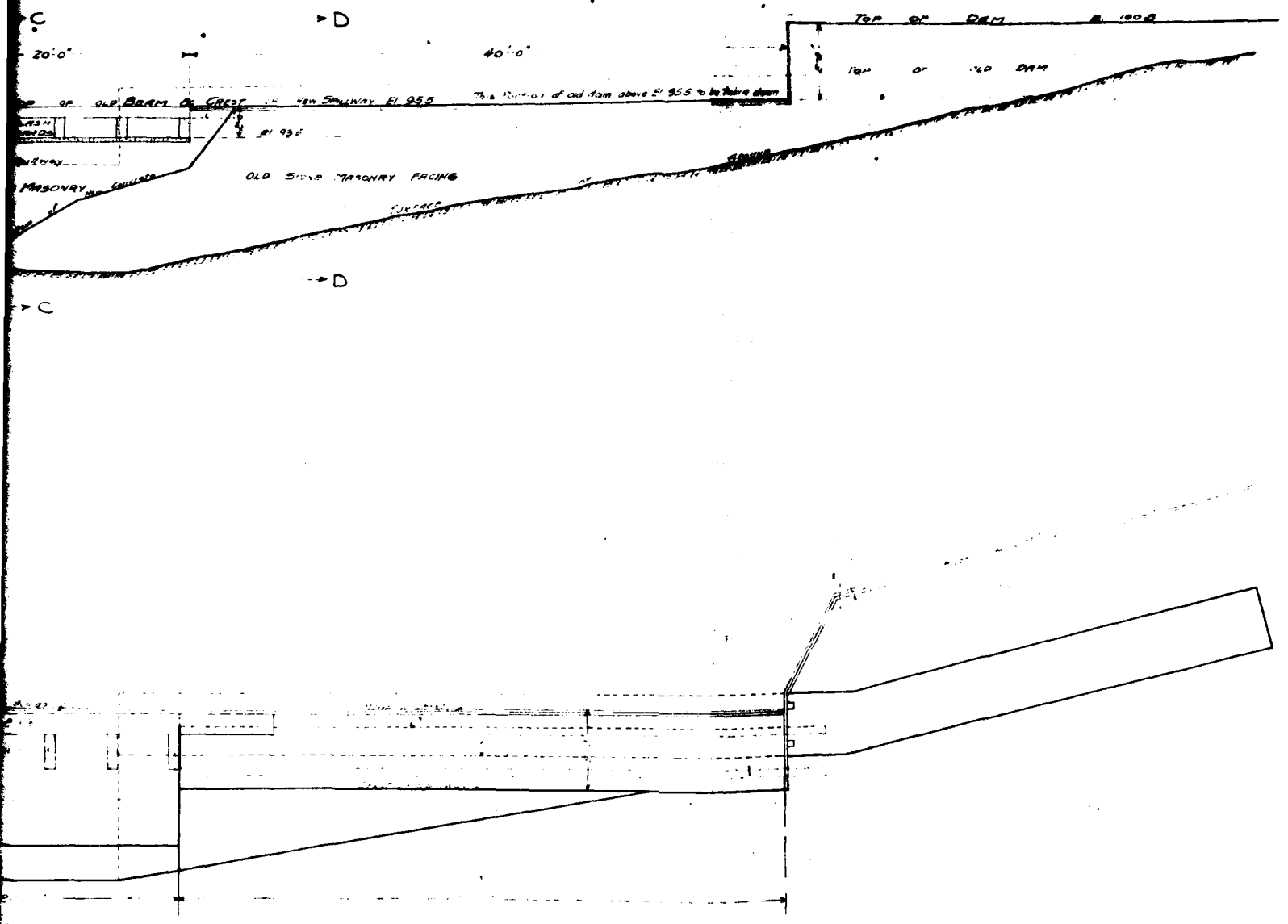
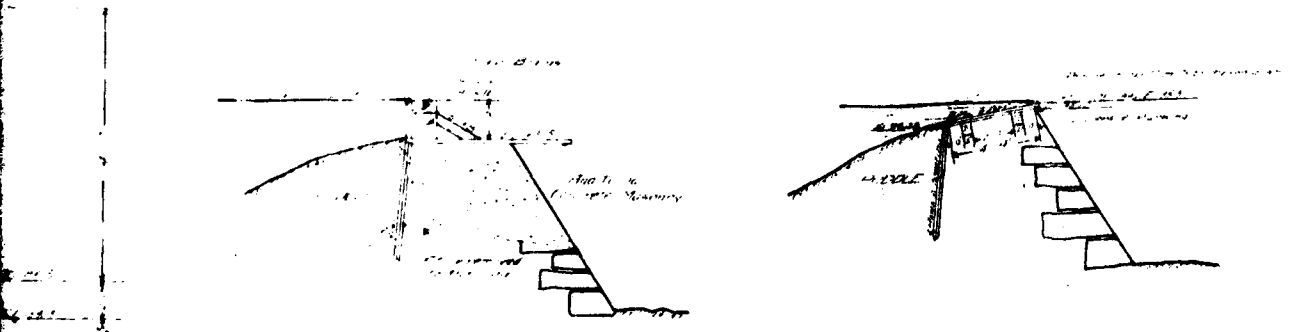

SLUICE
SECTION BB





SECTION CC

2

SECTION DD

REVISED PLAN

ERIE RAILROAD

JEFFERSON DIV.

DELAWARE & HUDSON

PENNSYLVANIA D

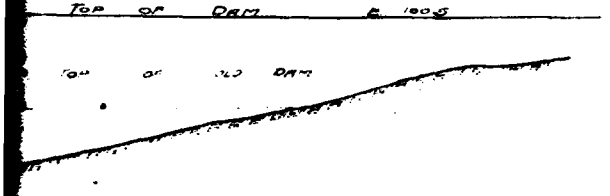
Proposed Changes

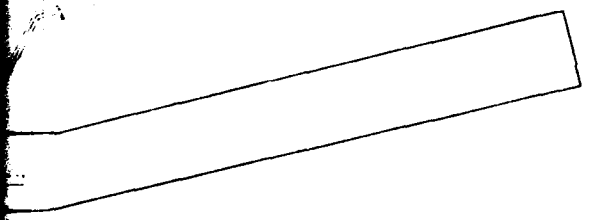
LEWIS LAKE.

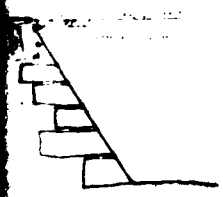
UNIONDALE

Office of Asst. Engineer

542 | 28





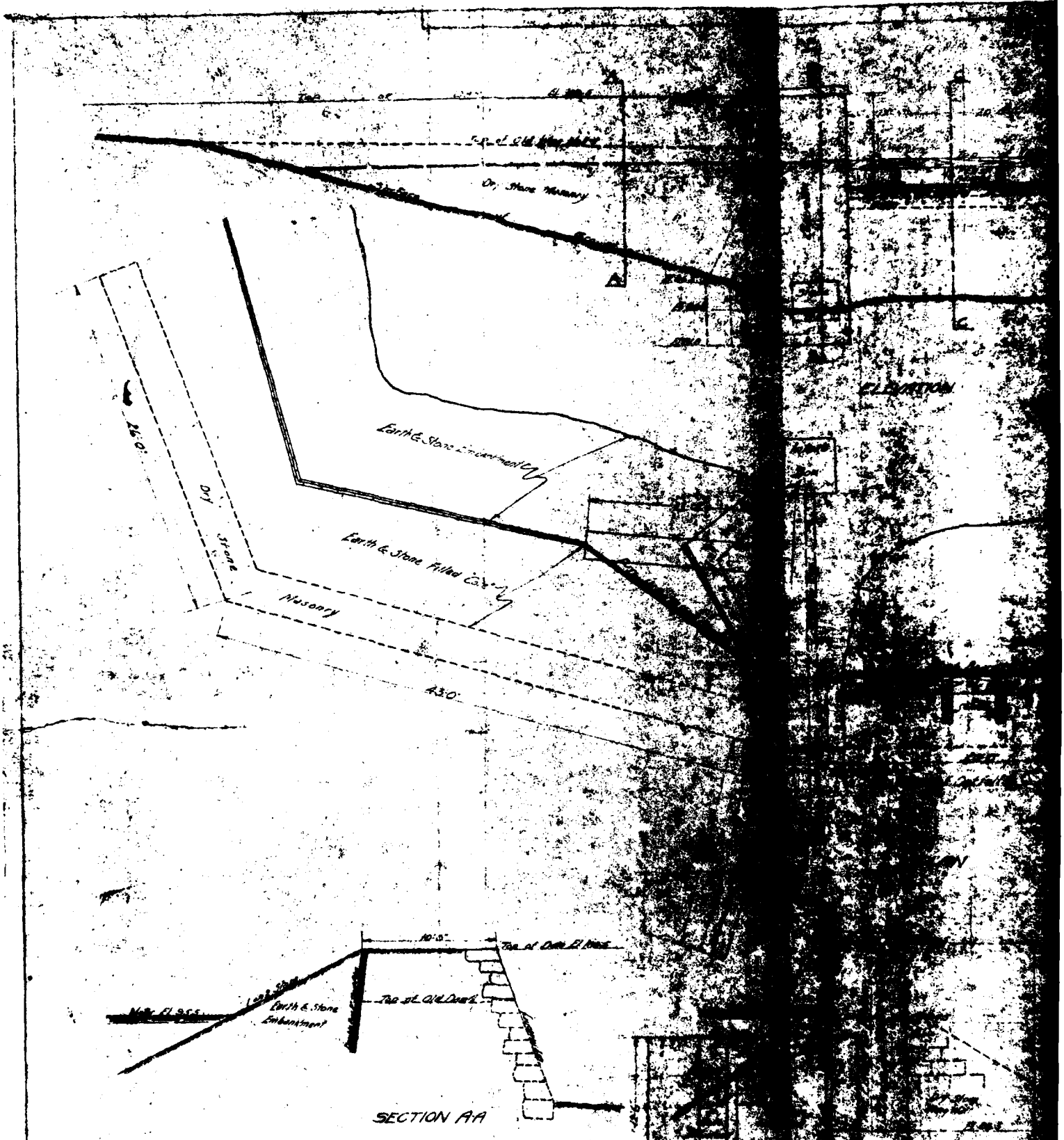


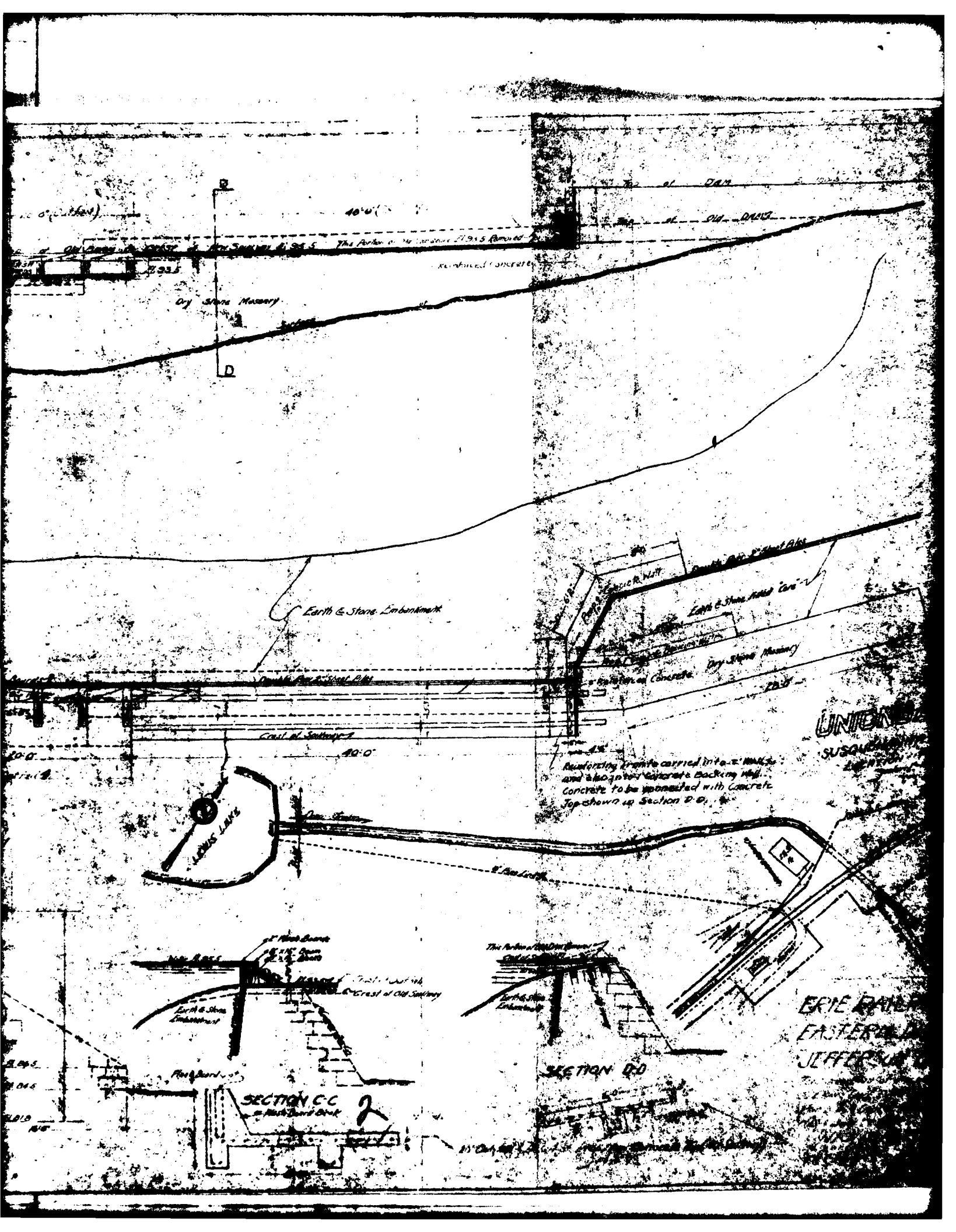
ERIE RAILROAD CO.
DELAWARE DIVISION

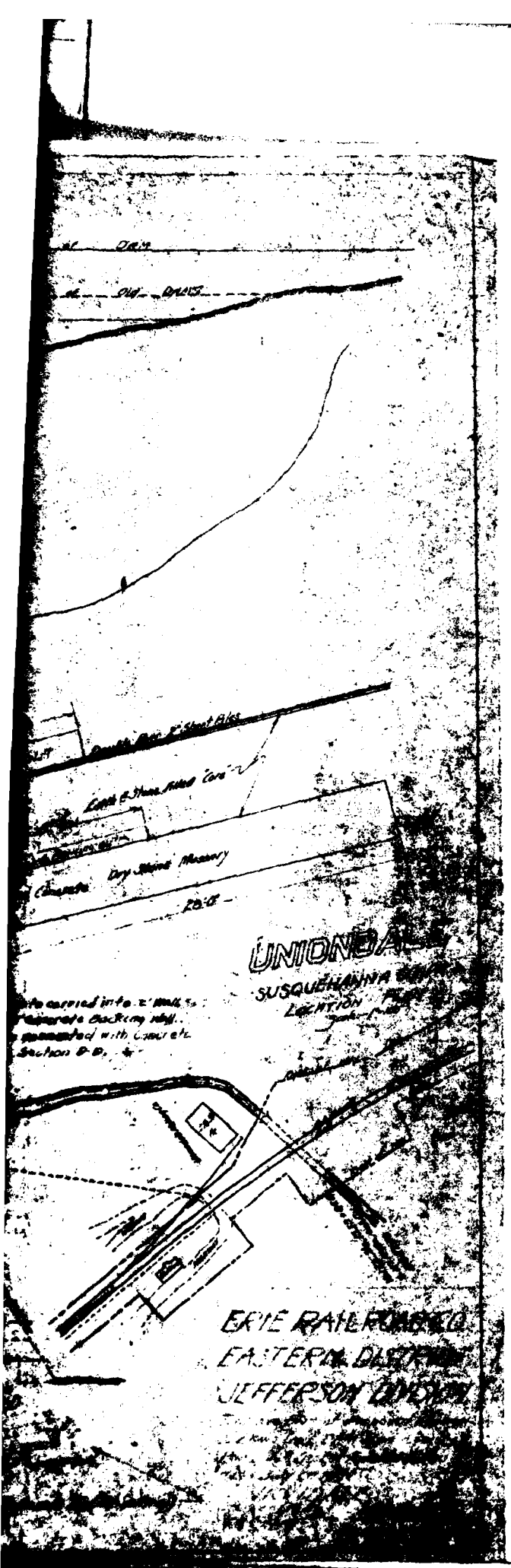
DELAWARE & HUDSON CO.
LACKAWAXEN DIVISION
Designed & Drawn by
LEWIS LANE
UNIONDALE, PA.

542 | 28247

PA-00061
PLATE III


Dr. Stone Masonry
Earth & Stone Embankment
Earth & Stone Filled Cell
Masonry
430'
Dry Stone
Earth & Stone Embankment
SECTION AA


D
D
Dry Stone Masonry
Earth & Stone Embankment
Coast of Spillway
40'0"
LEWIS LAKE
SECTION C-C
SECTION D-D
2



3

PA-00061
PLATE IV

APPENDIX F

GEOLOGIC REPORT

GEOLOGIC REPORT

Bedrock - Dam and Reservoir

Formation Name: Catskill Formation, undifferentiated.

Lithology: The Catskill Formation consists of red shale interbedded with gray, cross-bedded sandstone, with some conglomerate, some red sandstone and gray to olive green shale.

Structure

The dam is located on the western limb of the Lackawanna Syncline. The strike of the beds here is nearly N-S and they dip 5° to 10° east.

Air photo fracture traces trend: N30°E, N10°W and N50°-55°W.

Overburden

The site is within the limits of Pleistocene glaciation and variable thicknesses of glacial till and outwash sediments are present in the area. No boring or test pit information is available.

Aquifer Characteristics

The rocks of the Catskill Formation are essentially impermeable and ground water movement is entirely along bedding planes and fractures. The most permeable aquifers in the area are the sands and gravel of the glacial outwash commonly found in the valleys.

Discussion

No plans are available for the original construction of this dam. It has been repaired and rebuilt several times. In 1929, a cutoff wall was added on the upstream face of the dam. It is reported to have been dug two feet into sand and hardpan. In 1930, "heavy leakage" was noted downstream from the dam. This leakage could have been either along permeable zones in the overburden, or along the N55°W fracture trace in the bedrock.

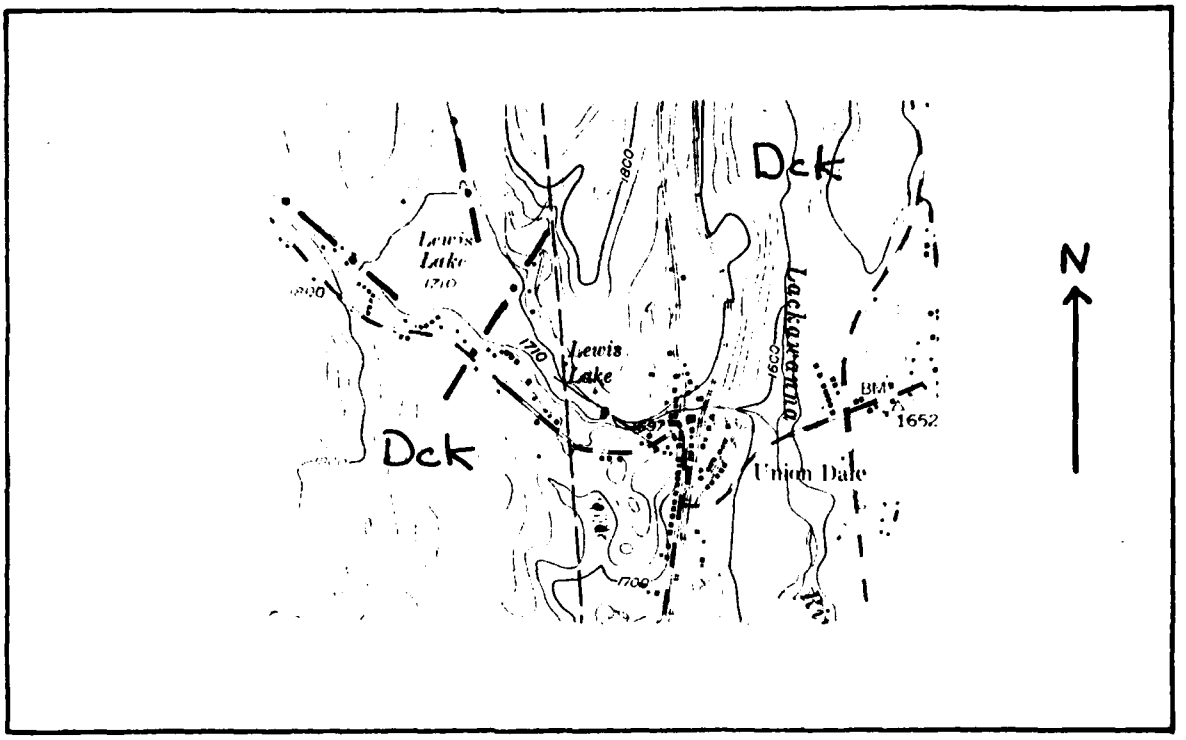
Sources of Information

1. Manuscript Geologic Map of the Forrest City Quadrangle in open file, Pa. Geologic Survey, Harrisburg, Pa.

2. Air Photographs, dated 1969. Scale 1:24,000.

3. Reports in file.

GEOLOGIC MAP - Lewis Lake Dam



Dck — Catskill Fm.- undifferentiated

—·—·— air photo fracture trace

SCALE 1:24000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET


DA
FIL
2